

THE SENSITIVITIES AND EXPRESSIVE CAPACITIES OF
YOUNG INFANTS IN COMMUNICATION WITH THEIR MOTHERS.

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ABSTRACT

In current developmental psychology theory an important but, on the whole, much neglected question is that of the capacities inhering in the infant which permit him to participate in interactions with other people. Often, the repertoire of acts and expressions he brings to personal encounters in the first three months of life is considered diffuse, undirected and largely insensitive to the subtleties of the adult partner's ongoing behaviour.

The aims of my study were to critically evaluate the different accounts of the nature of such capacities, and in particular to examine the claims of those who propose, in contrast to the more prevalent view mentioned above, an inherent inter-subjectivity, i.e. the pre-adaptation in the infant for co-operation and the sharing of states of mind, involving sensitivity to the attentional and affective structure of others' acts, expressive capacities to communicate such functions and moreover, the motivation to achieve mutuality and reciprocity in interactions with others.

A set of experiments, employing the principle of perturbation, was designed which would distinguish between the alternative theories of the nature of the infant's involvement in early face-to-face communications. These consisted of the mother's appearing briefly unresponsive and blank-faced, her being naturalistically interrupted in the course of talking to her baby, and the mother's behaviour, whilst remaining constant in form, becoming unco-ordinated with respect to the baby's. This involved the development of a double closed-circuit television system, which gives increased scope for recording and controlling communication between the two partners. A final experiment was conducted to assess the influence of the infant's ongoing activity and responsiveness, in relation to the

mother's behaviour, on the content and form of her baby-talk.

A fine level of description was used, and comparisons^{were} made of the infant's behaviour in the face of normal and the variously perturbed conditions. The results confirm the claims of those proposing an intersubjective capacity. The infants, between six and twelve weeks of age, were invariably sensitive to the changes in the mother's behaviour during the perturbations. Alterations in the occurrence, organization and form, particularly of acts of attention, communication and affective expressions, occurred during experimental treatments. These changes, moreover, seemed intuitively appropriate to the particular form of perturbation. The quality of these changes, and particularly manifestations of protest and distress, confirm the claims of a commitment to engage in mutually, reciprocally regulated communications, and argue against purely cognitive explanations of affect and attention in interactions.

Finally, it was found that the mother's baby talk underwent systematic changes when her baby's acts ceased to be potentially responsive to her communication, further confirming the active influence of the baby in contributing to the quality and structure of their interactions.

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CHAPTER 1

INTRODUCTION:

EXPLANATIONS OF SOCIAL DEVELOPMENT IN INFANCY

A COMMON CONCEPTION OF SOCIALISATION

A theme often found in current theories of infant social development is that in some crucial way an infant only attains the status of a social being with the internalization of socially defined meanings for his actions. This development is generally held to be tied in with processes of conceptualization, symbolization and, of course, ultimately, the acquisition of language. One way to characterize the assumed process is to see it as the development of shared understandings of actions and events, with a concomitant capacity for both symbolic representation of these actions and events, and the expression of such representations in communicable forms under voluntary control, and therefore with conscious intent.

Themes Apparent in such a Conception

a) The importance of representation

In speculating on the origins of such a formulation, it first appears no coincidence that the capacity for representation has been considered the hallmark of mature human activity within the framework of Piaget's most influential theory of infancy. This theory, however, gives little emphasis to the nature of social development (Piaget and Inhelder, 1969). Yet Piaget's influence is explicitly acknowledged by Newson, (1975) and is evident in the work of Schaffer, Bates, Bell and many others.

b) Learning models

Also within this kind of theoretical framework, which conceives of infant social development as fundamentally cognitive in character, the

infants becoming social being seen as dependent on the precise opportunities for learning he discovers in his particular environment, is the work of Watson and Papousek, both of whom apply models of instrumental conditioning.

c) Sociological models

The influence of sociological theory is also apparent, particularly in the work of Richards and Shotter, and to some extent in that of Kaye. It's particular force is to underline the role of the caretaker in conveying to the infant the particular social/cultural significance of events; that is, to give the caretaker responsibility for the process of developing shared social understandings.

An Alternative View

On the other hand, workers of diverse interests (paediatrics, psychoanalysis, ethology, biology and linguistics) have each emphasized those aspects, either innate or inherently developing in the infant, which facilitate or even make at all possible the very processes of tuition or induction into social life described by those above; and it is generally held by this group that in some important sense infants are social or personal from birth (e.g. Brazelton, Wolff, Ainsworth, Trevarthen, Bruner).

In explicating below the distinctive approaches to this question, it is hoped that a clearer understanding of the process of social development may emerge; the implications each has for the way in which the roles of mother and infant are considered in interactions with each other being the focus of particular interest.

1. The Sociological Influence

Those workers (e.g. Richards, Shotter and to some extent Kaye) who have been influenced by sociological theories (e.g. the work of Becker, Berger and Luckman, and in the case of Shotter and Kaye - G.H. Mead) tend

to stress the transformation of the infant from an asocial biological being to a social being, this transformation being effected through the agency of social adults and primarily the mother. Such an approach tends to emphasise the active nature of the mother's role, in particular, in their interactions. (The approach of Schaffer, to be outlined at a later point, shares this belief in the mother as active source for an initially simple and asocial infant.) The tendency of mothers to interpret their infants' behaviour and to impute intentions has received general notice, as has the clear discrepancy between the mother and infant in terms of their knowledge of the culture - e.g. Newson (1974) states "one member of the interacting pair is highly sophisticated and culturally competent whereas the other is completely culturally naive". Opinions differ however as to both the degree to which the mother's activity is constructive and formative, and the precise nature in which it is so, and there are corresponding differences in how the status of the early activity of the infant is conceived, e.g. on the one hand as in some sense intentional at first (Trevvarthen, Bower, Bruner, Newson) or as almost entirely reflexive or the outcome of internally generated automatic processes, relatively simple in organization (e.g. Schaffer, Kaye).

As noted above, those with sociological interests tend to focus on that aspect of the process which highlights the mother's skill as a practising agent of culture in conveying the values and significance of events to the infant - "The newborn is not fully social as he is not a complete member of a social community. Rather he is a biological organism with biological propensities and organization who becomes social through his encounters with social adults" Richards (1974a). The infant takes on the attitudes of others to give meanings to his acts. Whilst rejecting the term socialisation as meant in the American neo-behaviourist school "where socialisation is seen as a psychological

process of learning, of training of the individual" imposed on the child by conscious effort, Richards draws on the tradition of phenomenological sociology. In his conception of socialisation, using Becker's 1972 definition, he takes the term to mean "the formation of human beings out of helpless dependent animal matter - it explains the original formation of the social self" (Richards, 1974b). Becker also puts this as "the switch from body modes to symbol modes of behaviour" and "the social identity is largely symbolic" (reminiscent, we should note, of the transition in Piaget's terms from the sensori-motor to the symbolic). The capacity both to give meanings to acts and for self reflection is held to go along hand in hand with processes of ideational representation. The relationship is expressed in Richard's assertion that for membership of society the individual

"must be able to assess and use the social context in which he lives so that it can give meanings to his action. He must form an internal picture of his world so he can order it and reflect on his own actions from the position of others" (Richards, 1974a).

This theme is clearly outlined in the position of Berger and Luckman (1967), upon whom Richards draws when he contends that "the infant is predisposed to become social". Berger and Luckman state

"the individual however is not born a member of society. He is born with a predisposition towards sociality and he becomes a member of society. In the life of every individual, therefore, there is a temporal sequence, in the course of which he is inducted into participation in the social dialectic. The beginning point of this process is internalization: the immediate apprehension or interpretation of an objective event as expressing meaning, that is, a manifestation of another's subjective processes, which thereby becomes subjectively meaningful to myself".

The emphasis on the mother's constructive role in conveying meaning implies that the origin of meaning for the child inheres in the mother.

Furthermore, in all of the theories of this kind the link between the infant's action and the meaning attributed to it by the mother is held to be only tenuous. Richards describes the process by which some activities in infants, which have highly structured temporal patterns, are assumed by adults to provide indications of what is occurring inside the infant. They assume that smiling represents a state of contentment or stability, and crying, hunger or some other discomfort:

"By such recognition they confer the status of social actions upon these behaviour patterns. But it must be stressed that this recognition involves cultural assumptions and is not simply a matter of putting inevitable labels on behaviour."

(Richards, 1974b)

Evidence used by Richards to substantiate the importance of historical and arbitrary cultural factors determining a significance for the baby's actions comes from a study done with Bernal (1972) in which mothers' responses to infants' cries were analysed: mothers reported using factors such as the length of time since the previous feed as determining their response to crying; very few reported taking the nature of the cry as the cue.

In this view, what the infant brings to the situation is an initial attraction for features in the environment which facilitate the agreement of communication channels through which the negotiation takes place, plus developing sensitivities to, and differentiation of, parameters of the social environment - e.g. the timing of interactions, the drawing of phonological distinctions specific to that culture.

Thus, for Richards, an essential feature of being social is to take a part in a particular social context, to be able to have internalized a representation of the meaning of one's actions within such a context. Shotter, too, pursues this theme, using as a paradigm the theory of the development of the self as expressed by G.H. Mead, where consciousness and conscious intention are key elements in the constitution of the

social and socially created self. Again, a transformation is proposed from a state in which the infant possesses 'natural powers' (essentially asocial) to that when he acquires 'personal (social) powers', a transformation mediated generally by the mother who makes the infant aware of the social significance of his spontaneous actions. Shotter states "in the transformation of spontaneous into deliberate action the child is reliant on others to give meanings to his acts" (1974a). "Man as agent in a community evaluates his actions in other peoples' terms - action involves knowing one performed it" (1974b). "If he is ever to act responsibly he must learn to use different forms of behaviour in ways which make sense to other people" (1974c).

G.H. Mead

In Mead's theory of Social Behaviourism the transition to the social self, effected both phylogenetically and in the history of the individual, is entailed in the progress from the conversation of gestures to language. An individual's 'self' arises along with the capacity to represent itself as an object of awareness, and this is achieved only by active negotiation with both the physical and the social environments. At first negotiation takes place at the level of the gesture. The gesture arises as a separable element in the social act only by virtue of the fact that it is selected out by the sensitivities of the other organisms to it; it does not exist as a gesture merely in the experience of the single individual. And, although the gesture may come to constitute conduct in which the guidance and control of experience is possible, i.e. it may lead to behaviour which is an outcome of a preparation entailed in the gesture, it does not generally carry with it, as language does, reference of the individual to himself.

"It is not acting in a fashion which calls for a response from the form itself, although it is conduct with reference to the conduct of others".

Mead states "insofar as the conversation of gestures can become part of conduct in the direction and control of experience, then a self can arise". Yet, the possibilities for direction and control generally result from the process of the other's attitude towards the gesture being taken up by the individual, and this process of taking up or transfer is more appropriately carried out via ideation and language. Therefore, although the conversation of gestures is part of the social process, it is really the development of language which has made possible

"the taking over of the external social situation into the conduct of the individual himself. There follows from this the enormous development which belongs to human society, the possibility of the prevision of what is going to happen in the response of others and a preliminary adjustment to this by the individual".

The fact that the self rests on the capacity for representing oneself as object, means that it is very much tied in with processes of conceptualising, memory, symbolic activities like those involved in play and games, and especially language. It is clear that the meaning given by Mead to 'self' is specific: it relates to the self of self-awareness and self-consciousness. It does not encompass the unconscious self which Mead admits of in the case of habits which have become automatic. It does not encompass experiences outwith the bounds of memory. Thus someone suffering from amnesia would not in Mead's view retain his former self (even though presumably, others not interacting with him identified him as the same person whom they knew previous to the amnesia), he becomes a different personality. "The past has a reality whether in the experience or not, but here it is not identified with the self - it does not go to make up the self."

This self of self awareness is constituted, then, as an object of consciousness, and it becomes so through the process of putting oneself in the position of the other towards oneself, of taking on other's attitudes towards oneself and then reflecting them back.

It needs to be said that the phenomenon described when an infant begins to give socially significant meanings to his actions is doubtless an all-important one, one that enriches and transforms social life in significant ways: there can be no doubt of the truth of Becker's statement that "we learn the full significance of our acts from those around us self reflexivity gives us a much greater depth of experience" (1972), and the force of this process for the individual should not be underestimated. Nevertheless, it will ensue from the following discussion that emphasis on this particular facet as constituting the core of sociality perhaps runs the risk of undervaluing its prerequisites to the extent that the phenomenon becomes inexplicable.

2. The Contribution of the Cognitive-Developmental Approach

Work on cognitive skills in the infant, and the ethological studies of interactions between the infant and others have led to a rejection of the tabula rasa view of the infant and the accounts of sociability in terms of secondary drives. The problem of the nature of early social relations has been posed in the approach considered here in terms of species-specific capacities in the infant which are fundamentally cognitive and perceptual in character. This applies also to contingency theorists (e.g. Papousek and Watson) as well as to the cognitive developmental approach outlined by Schaffer.

Schaffer's view, expressed in a number of reviews of the literature, (1971, 1974, 1977) is that at birth the human infant is basically an asocial being, without predispositions to social interaction as an end in itself. However, he considers that the infant comes into the world with certain cognitive and perceptual predispositions which incline him to find other people attractive, and certain behaviour patterns which impel others to be drawn to him. Firstly, he is thought to be preset to respond and to be attracted to certain simple perceptual arrays or

configurations. Such stimuli presumed relevant have been analysed along physical parameters of complexity, contrast, movement, brightness, patterning and solidity: the consensus reached from a review of experimental studies (Schaffer, 1971) is that the infant is preset to respond to stimuli which constitute, in the normal environment, attributes of other people. The same conclusion is reached moreover for auditory stimuli. However, if the infant does respond preferentially to people or their attributes, it is not considered that this is a social response to a person, but rather is due to the inherent attractiveness of these perceptually salient features - thus "the face is meaningful to the baby not because of its 'facedness' but because it possesses certain primitive stimulus attributes" (Schaffer, 1971).

In a consideration of the essential characteristics of mothering, Schaffer takes into account not only her stimulating qualities in terms of properties that are visually and auditorily attractive, but other aspects too are held to be rewarding to the infant in two respects: firstly because her behaviour tends to be contingent on the baby's activity - "the extent to which the mother acts as a source of reinforcement depends on her ability to respond contingently to her baby" (ibid); and secondly, the mother's modulation of the infant's arousal level is held to be reinforcing.

"Both lowering and raising excitement in the infant can be pleasurable if they return to an optimal level, and if these changes always necessitate the presence of the mother the infant in time will learn to seek her out as the agent of arousal production or reduction". (ibid)

Another preadaptive feature for both mother and baby, Schaffer notes (1977), which furthers mutual involvement is the inherently determined synchrony of movement patterns, illustrated particularly in Condon's work (Condon and Sander, 1974; Condon, 1977).

Furthermore, on the expressive side, consideration is given to

such discrete infant behaviours as crying and smiling. These are thought to be initially of either some kind of internal origin, or to be triggered off in automatic fashion by relatively simple stimulus configurations such as noted above. Although Schaffer emphasises the fact that the infant is not passive, and that behaviours such as crying and smiling, and his state, have compelling effects on others, they are primarily seen in terms of reflex mechanisms rather than as genuinely social events that are both responsive and directed to the complex acts of another person. In Schaffer's view, which is conventional among a majority of developmental psychologists, the infant's expressive behaviours constitute a major component of sociability—primarily in respect of their complex organization, regularity and predictability for others. It is these qualities, enabling adults to fit in their behaviours with those of the infant, which it is claimed, render the latter behaviours potentially social. At first they are not social for the infant -

"At first crying is an expressive pattern, that is, it tends to be initiated more or less automatically by a set of stimuli, mainly of organic origin - which trigger off the response regardless of any likely consequences".
(Schaffer, 1971).

Methodology in the determination of such theories of socialisation

The emphasis in this approach on perceptual configurations as a primary source of attraction for the infant, and on discrete behaviours such as crying and smiling, would seem partly to stem from the artificial experimental methodology adopted by most workers. Until recently few researchers have looked at the structure of natural interactions. In order to analyse which constituent parts of complex events are the effective stimuli, ^{commonly} a series of simple configurations varying along a specific physical dimension is presented to the infant: differential responsiveness, e.g. the amount of smiling or looking to the

configurations is taken as evidencing those properties which, when in the context of a more complex situation like an interactive one, are responsible for eliciting those same responses. On the expressive side, as already noted "The smile", assumed to be a discrete entity, but not precisely described, is often taken as the criterion for preference (e.g. Watson, 1966), or as indicating recognition of the familiar (Piaget, 1936; Kagan, 1967, 1971). On the other hand, discrete crying episodes have been used as stimuli for adults and their reactions noted (Wolff, 1969).

However, developments taking place in linguistic studies of the nature of communicative skills point to the shortcomings of such purely experimental approaches. Until recently, the most common unit for the analysis of communicative capacities in language has been the monologue, and within this more often ^{than not} the isolated sentence. Yet Abercrombie (1965) suggests that in fact the monologue may be an incomplete derivative from dialogue. Even when two-way exchanges have been looked at, they have usually been highly structured interviews rather than spontaneous conversations, which have different qualities. Recently however (e.g. Barker, 1963 and the ethnomethodologists) researchers have turned to more naturalistic situations in order to get at receptive and productive skills; and Barker makes the point that natural units can be seen more validly with non-interventive methods of observation.

In spite of such considerations, it can be seen that in the cognitive developmental theory outlined here the structure of naturally occurring interactions has often been neglected; at first the infant is not considered to be motivated to interact with another person in a specifically social way, but interrelations are assumed to be fundamentally reflexive, perceptual or cognitive in nature. The infant has to learn through his particular experience with others how to relate their behaviour with his; at first there is no genuine reciprocity and

any apparent interchange is entirely due to the mother's adapting her behaviour to the infant's repertoire of acts. This is held to be relatively autonomous, or, if not, then organized at the level of reflex mechanisms; his actions being, for example, triggered off by perceptually salient stimuli. The precise nature of these assumed interchanges will become clearer in a discussion of the work of Kaye (pp. 145).

For Schaffer, the advent of conscious intentionality is held to be a key element in genuinely social behaviour that is reciprocal and dialogic (Schaffer, 1977). He links this specifically to the development of cognitive mechanisms according to the scheme of Piaget, e.g. to the differentiation of means and ends achieved on reaching sensori-motor Stage V, the attainment of object permanence, the expansion of memory capacities and attention span, and the differentiation of self from other. The representation of objects, and of the mother in particular, is likewise thought to be fundamental to the formation of attachments, operative in the fear of strangers, and correspondingly in the separation response (Schaffer, 1971).

The development of acts that are purposively directed in an interchange, as well as being mediated by the cognitive mechanisms described above, is held by Schaffer (drawing on the work of Hunt, Watson and Papousek) to be facilitated by the consistent and contingent nature of the mother's responses ^{which} enable the infant to build up expectations of the effects of his acts, and then to use them purposively to achieve results. This is thought not to be possible until around the end of the first year.

The attainment of conscious awareness and representation of acts and the ends towards which they are directed, has, as noted above, also been held as a criterion of genuinely social behaviour in the work of Richards and Shotter, and is also considered important in Newson's

account of social development. Its relevance for the way in which the relative roles of mother and infant in early interactions are considered must now be assessed.

Since the infant is not held to direct his actions intentionally to other people at first, recognising them to be persons with feelings and purposes of their own, the appearance of dialogue-like behaviour between mother and baby is seen as a consequence of the mother's skill. This means that, in fact, there is merely a pseudo-dialogue or pseudo-conversation early on since there is only a one way direction of effect. One of the most detailed studies to be done on early potentially interactive behaviours within a conceptual framework close to that taken by Schaffer is that by Kaye on feeding (Kaye, 1977). The problem posed is how to account for the development of truly interactive capacities; for example, the change in feeding sessions

"... from a stage in which his (the infant's) eye movements are merely interpreted as an index, to a stage when they really are an index and the mother's behaviour with respect to them matters, from a stage when they are interpreted as a signal, to a stage when they really are a signal."

In face-to-face situations studied from six weeks onwards, we have to account for the transition from behaviour which "takes the form primarily of indexing internal states" to that at three months when one sees 'true signals'. Kaye notes of the infant that somehow he gradually takes on himself some of the adult's role in interaction - initiation, adjustment of timing, etc. Referring to Collis and Schaffer's (1975) study of infants at six months and one year, Kaye remarks that mothers

"... fit their own behaviour into the infants' so that the infants' subsequent behaviour will seem to be a contingent response ... gradually it comes to be true that the infant is fitting his behaviour into hers".

Yet he admits "we still have very little understanding of how mothers' false beliefs about their infant's behaviour come true". The fact that

the problem is posed in this way (and it will be shown that this is a misconception)- seems to stem partly from the emphasis on reflex behaviours, physiological needs and endogenously generated behaviour patterns in the young infant, upon which all subsequent psychological processes are built up. This leads, as noted above, to a conception of the infant as ^{at first} having a very different interactional status from that of his mother so that their interaction has a fundamental asymmetry.

"The newborn infant and his mother have very different agendas. The infant responds to hunger as to pain, cold or distention of his bowel; he is equipped with certain reflexes and he gradually becomes able to anticipate what the sequence of events will be as those reflexes occur".

This emphasis is consistent with Schaffer's stress on "The various internal factors" and "endogenously regulated reflexive behaviour" (Schaffer, 1971). Both emphasise not only the physiological nature of the infant's needs, but also the patterning of his behaviour in time. For the infant, Kaye states "his very immaturity at birth guarantees a degree of salient regularity, rhythmicity and predictability to his behaviour which will not again be possible". This picture is set against that of the mother who not only brings her skillfulness and dexterity to the interaction but also her very different motivations - to engage in a true interaction, to be "a participant in the organization of his day".

Such a perspective leads both to the conclusion that what may superficially look like interactions are not in fact genuinely reciprocal exchanges; rather it is the case that the mother is "left entirely to fill in the pauses. What one then observes is a synchronization of the two sets of responses which in fact does not yet reflect true reciprocity" (Schaffer, 1974). Again at five months "one can get interactional synchrony thanks to the mother's activity" (ibid). The

same conclusion is reached by Kaye from his study of the patterning of mothers' jiggling activity whilst feeding their baby; although mothers believe their jiggling during a pause in the infant's feeding influences the infant to resume sucking, Kaye thinks that they are wrong in this belief, moreover

"... we do not have an interaction, we have simply the behaviour of one person organized biologically and the behaviour of another person fitting into the organization somewhat. It is a one-way direction of effect"

(Kaye, 1977)

and further

"... his bursts do not depend on her intervention at all ... if she does nothing he will organize his sucking in essentially the same manner"

(ibid).

In fact, it is not clear that the data^{which} Kaye presents does indeed support this conclusion. Furthermore it is contrary to evidence presented by Wolff, (1968) who shows that neonatal sucking is responsive to external stimulation.

Nevertheless, such a position raises a particular theoretical issue, i.e. the question of the prerequisites inhering in the infant in order that the process of taking up another's interpretation of the meaning of one's actions can take place at all. For example, the infant's sensitivity to the contingent or reactive nature of the mother's responses has been assumed a potent factor; but how great an influence is it in the development of communication?

3. Contingency Theory - Mechanistics of Perception and Learning

For theorists such as Papousek and Watson who have a strong Pavlovian and behaviourist inclination, the detection of contingency is of great importance. Both of these workers have been associated with research into the learning capacities of infants using both classical and instrumental conditioning paradigms; Papousek having made contributions

of fundamental importance in the field of infant learning in the 1960s. Both think of the infant as more of an active partner in early exchanges, with the physical environment and with other people, than is the case in Schaffer's theory. Papousek draws attention to the complex and hierarchically structured and potentially predictive behavioural repertoires of young infants, who are seen to process and organise information and adapt accordingly. Watson outlines the predictive models which he assumes to operate in the infant, involving both complex forward and backward detection of contingency (Watson, 1977).

Nevertheless, both these accounts share with the cognitive-developmental theorists a reluctance to take the acknowledged unique aspects of persons in their tendency for contingent responsiveness to the baby's acts ("only social stimulation has a comparable effect", Papousek, 1977), as evidence for there being a special quality to social relations, or for a preadaptation in the infant for social interactions per se. Rather, the inter-personal acts of infants are subsumed under purely cognitive operations, or ^{under} a very general system which Papousek terms a "fundamental cognitive response system underlying all others" (Papousek, 1975). This is an adaptive system functioning to ensure control over the environment and one's own actions. Interactions with people then, are considered just one area in which this response system operates, since mothers tend to respond contingently to their infants.

This point of view is consistent with the lack of attention paid by these workers to the form or quality of "stimuli" that are effective in regulating infants' responses, as opposed to the temporal relations between their occurrence and the infant's action. However, the adherence to a contingency analysis rather than one in terms of developing social relations with their own dynamics becomes problematic when

one attempts to account for developmental changes such as the infants' starting to avoid the mother around 12 weeks, or the preference for strangers which they may show about the same time (Caldwell, 1965 in Schaffer, 1971; Fitzgerald, 1968; Sylvester-Bradley and Trevarthen, 1978). Furthermore, pure contingency theory cannot explain the distinctiveness in infants' reactions to objects as opposed to people (Brazelton et al, 1974; Sylvester-Bradley and Trevarthen, 1978). Of course, if an object is given some characteristics normally found or supposed to inhere in a person, as with a contingency mobile (see Hunt, 1965; Watson, 1972), the differences become less clear. Even so, Wiesberg (1963) found, in an extension of Rheingold's work on conditioned vocalizations to a human social reinforcer, that conditioning did not occur if a simplified 'physical' stimulus, such as a bell, was the reinforcement. And Koch (1967) found, with two month old infants, that even if the reinforcer for head turning was social, if it was presented in particularly stereotyped form which did not involve extensive contact with the infant, e.g. merely the appearance and occurrence of the voice of the mother, then conditioning would not occur.

Again, neglect of the form of the behaviour, and failure to observe it in fine detail, in this case failure to look carefully at the form of the baby's acts, has possibly led to the responses to contingent physical events and those to persons being treated as equivalent. The case of 'smiling', a very common category of infant response in this kind of work, is instructive. When finer descriptions are made of baby's smiles clear differences appear in the type of response. Recent work by Dunkeld looked specifically at this question. She found that 6 week old infants responded with qualitatively different kinds of smile according to whether they were presented with a contingent physical event or a sociable adult (Dunkeld, 1979).

It should be noted both in this context and in relation to Mead's work that associationist-empiricist theories to explain the acquisition of reference on the basis of a contingent relation between ostentation (e.g. pointing) and naming have been shown to be inadequate (Bruner, 1975, 1977). Thus, we have to ask to what extent is the form of the adult's response, as well as the timing, crucial; and, if so, what are the implications for theories of a fundamental perception of mutuality inhering in the baby which goes beyond the capacities assumed in the cognitive theories and contingency approaches. These problems have been appreciated in particular by Newson, Bruner, Trevarthen and Richards, the latter thereby hinting at a paradox within his own theory as outlined above. Richards poses it thus

"... but if we do accept that cultural conventions do determine meanings of gestures in different situations we have hardly solved a problem, indeed we have raised a whole series of new ones. How does an infant discover what his smile means in different situations? How do adults interpret these kinds of gestures in infants?"

(Richards, 1974b)

That is, part of our conception of an infant's social development at this stage must incorporate a consideration of just what is entailed in his ability to pick up the mother's intentions and attributions; what is it that enables him to be instructed at all?

In the last analysis these questions represent two sides of the same coin: on the one hand, what is the basis on which adults attribute and impute intentions to their infants in the flow of their activity, and, on the other, what capacity must inhere in the infant for such attributions and imputations to be taken up from the flow of the mother's activity as complementing his actions and marking them with significance. Bruner (1976) considers that one of the most pressing areas of psychological research is that which examines how we perceive each other's acts; this applies in all cases, whether the acts are

considered as 'caused' or 'intentional'.

"Where social or transactional behaviour is concerned, even the causal chain between antecedent and consequent must contain an account of how the participants categorized each other's acts"

"What all this suggests at the very least is that we adopt the perception of intention and the perception of mindfulness as topics for research".

(Bruner, 1976)

Thus even if one conceives of the infant's behaviour as reflexively triggered off by the mother's contingent responsiveness, as in Kaye's account, we still have to think about the mechanisms by which the infant makes the link; how he picks up the mother's significant response from the flow of her behaviour.

Before going on to consider the solutions to this kind of problem proposed in the theory of intersubjectivity, a brief account is given of the approach of attachment theorists, since this shares several features in common with the cognitive position outlined here yet arrives at a point which is more fully developed in the theory of intersubjectivity.

4. Attachment Theory

Over the past century, and increasingly in the last twenty years, more sophisticated methods have been developed to study the perceptual powers of infants. The emphasis in the infant psychological literature (which has been noted in the approach above) ^{has been} on responsiveness to isolated perceptually salient features implicating a perceptual theory of sociability. This, and more recent developments in concepts of cognitive functioning, has sustained the view that the distinctive behaviours occurring around six months, when the infant is said to enter his first relationship (having now developed an attachment), are in an important way due to his having formed an internal representation of his mother. This internal representation of an object in the form of the

mother is furthermore held to be operative in the phenomenon of 'fear of strangers', the stranger being compared with the representation of the mother. Up until recently a relative lack of consideration has been given to more interactive variables within attachment theory - more emphasis being placed on what are seen as discrete behavioural patterns such as those proposed by Bowlby (1958) - crying, smiling, clinging, sucking, following - the component ^tinstinctual responses -; and this has led to the criterion for attachment being the infant's seeking proximity with the attachment figure. Thus the separation response (when the infant does not treat individuals as interchangeable in terms of remaining in their proximity) is considered by Bowlby to be "the inescapable corollary of attachment behaviour - the other side of the coin" and Schaffer notes "it provides the criterion whereby we may test for the formation of attachments to particular individuals". The emphasis on proximity and separation as key elements, which has influenced the cognitive developmental theory of Schaffer and which also shares a reliance on Piagetian stages, stems from a particular evolutionary perspective taken by attachment theorists; proximity seeking being seen as an evolutionary adaptation necessary for survival, as are the mother's responses to cues to bring about proximity with the infant.

Cross-species similarities in

"the maintenance of proximity ... is the rule, which suggests that such behaviour has survival value ... by far the most likely function of attachment behaviour is protection, mainly from predators" (Bowlby, 1979).

Although this approach differs from that of cognitive developmental theory in that it considers the infant as having an essential sociality from birth; and here, as far as the phenomenologists, the meaning given to social is distinguished from the idea of socialisation^{as} being induced control; this position has in the past gone along with the attitude that other behaviours are not considered relevant, e.g. Bowlby, 1979, defines

attachment behaviour as "any form of behaviour that results in a person attaining or retaining proximity to some other differentiated or preferred individual". An example of the neglect of other behaviours is shown in the conclusions drawn from Yarrow's study. He measured differential responsiveness to the mother and observer in terms of changes in activity, facial expression, and vocalization; latency, duration and intensity of responsiveness being noted. He found that 38% of the infants he observed showed differences in positive affect and approach movements to the mother by the end of the first month, and this was well-established in all his subjects by five months (Yarrow, 1967). In Attachment Theory, differential behaviours such as these are held not to reflect emotional attachment "for they signify nothing more than that a perceptual differentiation has taken place" (Schaffer, 1971); and these earlier behaviours are not considered to be constituents of an emotional relationship, rather their perceptual aspects being emphasised. The infant is only considered to become involved in his first relationship with investment of feeling once the above criteria for attachments have been met. More recently, however, the shortcomings of restricting one's analysis to discrete behaviour categories, ^{such} as proximity seeking, have been recognised; and growing interest has been shown by attachment theorists such as Ainsworth et al (1974), Bernal (1974), Dunn (1977), in different kinds of attachment relationship, as reflected in various interactive styles. Phenomena such as 'the separation response', which, as noted above, used to be taken as an "index of the quality of relationship between child and mother" (Dunn, 1977), are now seen as masking wide differences in children's behaviour. In these respects the interests of attachment theorists have come much closer to those who propose a theory of intersubjectivity.

5. Intersubjectivity

A theory of intersubjectivity, as formulated by Trevarthen (Trevarthen et al, 1974; Trevarthen, 1979) hypothesises some possible solutions to the problems outlined above, p. 18, and shares an orientation in common with that taken by Newson (1974, 1975, 1977) and Bruner (1975), and more recently by Bower. This approach leads to a redirection of emphasis in the conception of the relative contributions of mother and infant in their interactions. It is the inherent intersubjective capacity of both infant and older partner which is held to be the basis for cooperative states of mind and the sharing of mental processes, the performing of joint activity, and the general psychological capacity to behave cooperatively (Trevarthen, 1979).

Fundamental forms of intentional behaviour:

One aspect of the intersubjective capacity held to be present in infants from birth is their subjectivity. This, in Trevarthen's writings, refers to the rudimentary forms of intentionality present in infant acts. Whilst no claims are made as to the presence of conscious awareness or conscious intentionality, which as noted above has been held by some authors to constitute one of the key elements in genuinely social behaviour, nevertheless infant behaviour is held to reflect in its structure the same fundamental characteristics as adult intentional acts, and thus ^{to} signify subjective processes to others. Examples given by Trevarthen include saccadic or ballistic patterning of chains of movement elements in time, selective attentional focusing of receptors, and systematic orienting and displacing of effectors in a coordinated set in relation to the surroundings and in anticipation of events. Bruner too (1974, 1975) has applied similar pragmatic criteria to infant acts, which are also adopted in the analysis of adult intentional behaviour; and in his study of the development of skilled action he notes the

fulfillment of all these criteria from birth: namely

- 1) anticipation of the outcome of an act;
- 2) selection among appropriate means for the achievement of an end state;
- 3) sustained directional behaviour during deployment of means;
- 4) a stop order defined by an end state;
- 5) substitution rules whereby deployment of alternative means is possible to correct deviations.

That the form of the act does not depend on sensory feedback during reaching is shown ~~for example~~ by Alt's finding, cited by Bruner (1974), that ballistic movements of the arms of infants just beginning to reach effectively to objects at 15 to 20 weeks, are well aimed to an object, even when a blinder is placed beside the infant's eye ^{to} prevent his seeing his hands. Koslowski and Bruner (1972) claimed that, although the infant at this age does not actually grasp the object, the hand and arm movements are of roughly appropriate size. These findings confirm Trevarthen's (1974) observations on prereaching by neonates, as does the work of Bower which shows infant acts to be 'intentionally coordinated' to grasp objects in the first month. Newson too stresses this; in his assessment of Bower's work (1974) he makes the point that the infant's behaviour appears to be 'aimed at' objects and events around him and remarks on the early "patterns of action which demonstrate an interest".

Emotional Expression:

A characteristic of human subjectivity which Trevarthen emphasises is the accompanying emotional expression. Both the readily perceived intentional patterning of acts, and ^{the} equally perceptible adult-like forms of expression of emotion, mean ^{that} [^] the infant's subjectivity is communicated in intelligible ways to others. Moreover, Trevarthen makes the point that the expression of emotional aspects in particular can only have consequences in the environment if perceived by other persons since they have no functional effects on the physical world, thus reflecting, he

proposes, the infant's preadaptation to a world of people.

Mutuality:

The second aspect of the intersubjective capacity innate in humans relates to a fundamental facility for mutuality which permits the coupling of one's own subjectivity with that of others. Potent evidence for this to date is that of the infant's very early ability to imitate movements of unseen parts of his body (Maratos, 1973; Meltzoff & Moore, 1977; Dunkeld, 1979) as well as the existence of a complex of behaviours directed and receptive to persons as distinct from objects (Trevarthen et al, 1974). Voices constitute early auditory preferences; (Eisenberg, 1975) visual preferences are for features of faces; moreover, focus on the eyes (Robson, 1967), is held to reflect the infant's adaptation to transmitting his subjectivity in communication with other people. Further evidence for such a capacity is Condon & Sander's (1974) finding that infants may move in synchrony with the sound of taped human speech (but not to non human sounds or segmented vowels) from 12 hours old.

Implications for theories of socialisation:

The evidence of a rudimentary intentionality in the infant, expressing itself in the infant's adaptive acts on the environment, coupled with a facility for mutuality of perception and action, has a bearing on the way in which the mother's role in the process of socialisation is conceived; for, rather than considering the mother to be entirely constructive of meaning, the intentionally structured acts of the infant would be seen as yielding certain 'affordances' (after Gibson, 1977) to the mother which may set certain limits to her interpretations. This then offers one way of looking at the problem of the basis on which mothers may attribute intentions to the infant. If we see the infant as operating with purposeful and selective adaptation in the environment, it no longer remains a matter of purely cultural imputations if, say, the

mother attributes hunger to an infant who cries and has not been fed for $1\frac{1}{2}$ hours (as in Bernal's study, see above) since presumably time is an operative factor for the infant too. It is part of his context for feeding as well as the mother's. That infants' acts are context sensitive in the same way as his mothers' interpretations is suggested by Dore's study (see Bruner, 1975) of the patterning of vocalizations: by mothers, four months, whilst using the context of the infant just having woken in his cot to describe his calls as contented babbling, and interpreting calls before a meal as hungry fretting, or others as reflecting annoyance at not being able to reach, may also be picking up real distinctions in the voicing patterns themselves. As Bruner says, this suggests "that it may not be context alone that is used as a cue". Wolff (1969), too, found different behaviour patterns and type of crying before and after feeds in observations on newborn infants and further showed that mothers respond differentially, with their latency of response varying according to the type of cry.

It is interesting to note that the essence of this idea can be found in Mead's work, but unfortunately the theme has not been developed in his writings and it is not taken up at all by those who have applied his theory to infant social development. Firstly, in his discussion of the nature of meaning in the conversation of gestures, Mead makes reference to

"... the triadic relation on which the existence of meaning is based: the relation of the gesture of one organism in its indicative capacity as pointing to the completion or resultant of the act it initiates (the meaning of the gesture being thus the response of the second organism to it as such or as a gesture)".

With regard to the possibility of arbitrary or merely tenuous connections existing between gestures and meanings that can be made of them Mead states moreover

"... the assumption (that symbols are entirely independent of what we term their meaning) is baseless: there cannot be symbols unless there are responses;

"there cannot be a call for assistance if there was not a tendency to respond to the cry of distress. It is such significant symbols in the sense of a subset of social stimuli initiating a cooperative response that do in a certain sense constitute our mind provided that not only the symbol, but also the responses are in our nature."

The Mother's Contribution:

As we have said, the conception of intersubjectivity carries implications for the way in which the process of socialisation as a vital part of human development is conceived. Rather than the mother being regarded as wholly constructive, and the infant ^{as} passive, it may be more fruitful and less paradoxical to see the mother's behaviour as supportive, embellishing, enriching or containing. This would include both helping the infant to achieve his nascent and imperfectly formed intentions, as in the case which Bruner cites of the mother helping to limit degrees of freedom in a task which is outside the infant's own motor control - e.g. the proffer of a steadying hand to aid in the lifting of a cup, and of conventionalizing them. It is this kind of facilitatory and complementary function which Newson refers to as "a fundamental process of human acculturation" (Newson, 1977). The term acculturation seems particularly apposite since it is compatible with a view of the infant's behaviour as having no specific cultural significance without the mother's interventions, yet which, as he describes, can be seen as "statements which seem to emerge prepunctuated", with "distinct episodes" and "highly organized sequences of action patterns" (Newson, 1974). The tendency, commonly observed, of mothers to over-interpret would thus have as its function a way of letting the child know a particular cultural significance which may be given to his activity, a giving of meaning which goes beyond his individual intentions and thus secures his entry into a shared cultural life.

Such a theory of maternal enrichment of existing purposes also

leads one to a different conception of the relative contributions of mother and infant in the earliest face-to-face interactions. Rather than emphasising that the dialogue-like form of the interaction is a consequence purely of the mother's motivations and skill, this view assumes the idea of mutuality to cover sensitivity and responsiveness on the infant's part to the form as well as timing of the mother's actions. This, coupled with the idea of the infant as in some rudimentary sense intentional - as outlined in the pragmatic criteria for intentional behaviour applied by Bruner, Bower and Trevarthen above - furthermore implies a commitment to interaction itself, and a capacity for the regulation of it as such.

Many of these elements are to be found in the psychoanalytic theory of the British Object Relations School.

6. The Psychoanalytic Contribution

The psychoanalytic tradition has historically devoted the most attention to mother-infant interactions, and the contribution of the British Object Relations school in particular is interesting in two important respects. The work of Mrs Klein and R. Fairbairn has pointed to the capacity on the part of the infant, from birth, for organizing defences in order to regulate 'object' relations^{*}. The other contribution, that of Winnicott, is to offer a detailed study of the nature of maternal interactions with infants in both descriptive and functional terms.

Although Winnicott's work follows Klein's chronologically, it is considered first here since its relevance is of a more general character, pertaining as it does to the nature of mother-infant interactions in the first few months, rather than to the more specific question of how

* 'Object' relations in this work refers to the subject's relationship with others, the word object being used in contrast to 'subject', rather than to people, as would be the case in other branches of psychology.

infants cope with difficulties within the relationship in the 'here and now'. Winnicott conceives of the mother and infant at birth as forming a unit. On the mother's part the process of "primary maternal pre-occupation" (Winnicott, 1965), which starts to emerge in pregnancy and is now in full flow, generally ensures her empathy and identification with her newborn infant. On the other hand, the infant's state of utter dependency does not allow for any separation of "me" and "not me". The infant is thought of as being in a state of unintegration and unorganization (to a greater extent than, as will be seen, is considered in the Kleinian model). He comes only with his inherited potential, his "going on being", but with a tendency towards increasing integration and the motivation to seek something of himself back from the environment. The mother's empathy and identification enables her to complement the infant's immature state and needs to perform the important task of what Winnicott terms "holding" (Winnicott, 1960; Winnicott, 1965) and integral to this, the role of "mirror", (Winnicott, 1974).

Holding is of central importance in Winnicott's theory; it denotes not only the actual physical holding but includes the total environmental provision; it meets physiological needs (here physiology and psychology are not considered as distinct); e.g. it protects from physical insult, it takes account of the infant's skin sensitivity, his temperature, and the auditory, visual and other limits of his knowledge; and it involves both the completion and extension of the infant's initiatives, thus implementing his ego and making real his creative impulse which the infant in turn sees reflected in the mother's mirroring. In this way mother and infant form a unit, and for this reason maternal care is often only apparent when things go wrong: in health, with successful adaptation from the environment, the infant's ego is sustained and strengthened and he develops from being in an unintegrated to an integrated state. If, on the other hand, maternal care is inadequate at

this stage, the infant's "continuity of being" is interrupted by defensive reactions to the consequences of the failure; such reactions are generally to withdraw into isolation in repudiation of the environmental impingement in order to re achieve the "sense of self" (Winnicott, 1953). This brings about ego weakening or decline, and consequent distress.

This theme is echoed in the work of Spitz (1962) who has also stressed the constructive quality of the mother's identification with her infant and noted the parents' "tendency to imitate the gestures and sounds of their infants", i.e. to "mirror" (1962, Chapter 9). The identification is, he says, an integral part of object relations, without which the infant would not develop into a human being. The parental identifications

"... form a bridge for the infant to reverse the process with the aid of which he can thus become able to identify with them. The parents' identifications, unconscious, with the actions, feelings and desires of the infant possess without any doubt a constructive role ... mutual imitation of sounds and gestures has an important influence on the progressive development of the infant's personality." (Chapter 6, 1962)

It is interesting to note, in the light of current theories of mother-infant interaction in terms of the mother's contingency on the infant's activity, that Winnicott stresses that the adaptive characteristics of mothering do not possess the qualities of a machine.

"The whole procedure of infant care ... cannot be done by thought, nor can it be managed mechanically. It can only be done by continuous management by a human being who is consistently herself. There is no question of perfection here. Perfection belongs to machines; what the infant needs is just what he normally gets, the care and attention of someone who is going on being herself." (Winnicott, 1965 (6))

Moreover, the importance of the quality of maternal behaviour, in terms of the imitative and complementary characteristics of the holding process for the infant, gives an implicit sense of the infant's initiating and

active role in an interactive process; his is the motivation even though the mother may be the executor. The fact of his defensive withdrawal in the face of faulty adaptation implies some degree of regulatory capacity on his part, and his sensitivity to the adaptiveness of the mother's behaviour indicates a fundamental reciprocity. Thus the mother's responsiveness has a much more interactive status than a mere phasing of her activity into a flow of unresponsive, endogenously generated sequence of infant behaviours.

In fact, at a later stage (around six months), it is her very limitations and imperfections which Winnicott sees as essential to the infant's continuing healthy development; now, rather than complementing and extending the infant's initiatives to the point of merging to achieve the state of unity described above, the mother must be able to wait for the infant to signal his need by "the creative gesture, the cry, the protest" (Winnicott, 1960). This phase coincides both with a waning in the mother's state of primary maternal preoccupation and, on the infant's part, the beginning of refusal, analogous to a stage in the process of adult analysis

"... an intermediate stage in healthy development in which the patient's most important experience in relation to the good or satisfying object is the refusal of it. The refusal of it is part of the process of creating it". (Winnicott: 1965 (a)).

Presumably if this vital step in the separation process does not obtain the infant remains in an inappropriate symbiotic relationship which may culminate in a state of psychosis (Mahler, 1958). However,

"... in health when the infant achieves fusion the frustrating aspect of object behaviour has value in educating the infant in the respect of the existence of a not-me world." (Winnicott, ibid)

These comments bring out the fundamental similarity of psychoanalysts' concepts of mother-infant relations with those hypothesised to explain developments seen in the relationship between adult patient and psycho-

therapist.

Spitz, too, emphasises the importance of the infant's refusal in the development of object relations in the second half of the first year.

"To say 'no' to the libidinal object who was until recently the motor organ of execution of the satisfaction of the infant's needs means, firstly, an awareness of the separation of the ego and the object, and is secondly an enrichment of the infant's object relations." (Spitz, Chapter 6, 1962).

Although Spitz and Winnicott attribute some regulatory capacity to the infant in the process of interaction, they do not go so far as does Mrs Klein, the most prominent figure in the British Object Relations school. Her major theoretical contribution, which took psychoanalysis beyond Freudian theory, was to conceive of object relations as existing from birth, and to see the ego as having a much greater degree of structure than was formerly thought (and indeed than is admitted by Winnicott). Both her attribution of structure to the ego from the start, and the assertion of early object relations, were logical developments for her of the Freudian theoretical principle of the introjected superego (the forerunner to the Oedipus Complex at around 3-4 years). Two further aspects of her theory ~~that~~ assume a higher level of organization of the ego from birth than admitted in classical Freudian theory are her concept of phantasy, which is seen as an unavoidable accompaniment to real experiences, and the system of organized defences, operating from the start to cope with unsatisfactory aspects of relations (although such aspects are assumed to relate to the frustrations of gratification within the context of impulse theory rather than to the process of communication). The retention of impulse theory leads Klein to conceive of the death instinct as being the internal source of anxiety, some of which is converted into aggression. The conflicting impulse, also of internal origin, she sees as the libido. These impulses in interaction with reality become organized through the operation of various psychic

mechanisms into "positions" which characterize the structure of the ego and super ego at different times in development. Phantasy expresses the content of these mechanisms or processes (Segal, 1973).

In normal development, the "positions" in the first six months of life (which is the period under consideration here) are the 'paranoid-schizoid position' and the 'depressive position'; the former lasts until approximately the third or fourth month. The infant's ego is considered to be in a relatively unintegrated state at first, although tending towards increasing integration. Since he cannot at first integrate experiences of gratification with those of frustration, nor integrate the internal forces of the libido and the death instinct, the infant organizes and splits his experiences into good and bad, and correspondingly into two objects which are kept separate. With the aim of keeping the gratifying experiences and the libido intact and inside the ego, the death instinct and experiences of pain and deprivation are projected outside the ego, all with a view to warding off anxiety. This is the origin of paranoia. Further combinations of projective and introjective mechanisms may obtain to this end too, if anxiety results from the initial projection of the death instinct and experiences of deprivation into a bad object which is feared for its persecutory qualities - hence the term paranoid-schizoid position. Leaving aside for the moment the details of the possible permutations, the important feature to be noted in the process is that the greater the anxiety, the more effort there is to widen the split, introjection and projection being used to keep the good and bad objects apart and under control. In Klein's view there appears to be a series of defences available if anxiety increases; thus denial may be used if persecution is felt to be very intense, ^{while} the extreme method of fending off anxiety is to disintegrate.

Although much of the theory is developed from observations of the phantasy play of older children and from adults' analytical experiences,

so that there appears to be no systematic description of actual infant behaviour for each of the permutations hypothesised, several are described which are of relevance. For example, the splitting process and state of 'unintegration' is said to be apparent in the commonly observed rapid 'flipping' in the infant from a state of extreme distress to apparent unconcern within a matter of seconds when relief is provided (Klein, 1952). The projection of the death instinct and the experience of frustration is assumed to lead to the fear of the persecutory bad object in infants who, although apparently hungry, refuse the breast. A case is described (Klein, 1952, Chapter 7) of a 12-week-old infant who had been left inadvertently to cry for some time and who refused the breast but continued to scream and only calmed after having first sucked her own fingers, having again refused the breast. Klein sees this as a narcissistic withdrawal brought on by the disturbance in relation to the mother; the infant refused to give up sucking her fingers because they were more trustworthy than the breast. By sucking them she re-established the relation to the internal breast and thus regained enough security to renew the good relation to the external breast and mother.

A third example of defensive organization is given in the description of infants who present instances of having been perfect babies who never protested, appeared contented, but who showed a lack of interest in the mother in the first 3-4 months which develops into a later indifference towards people in general. She interprets them as being withdrawn from the world through the mechanism of denial, owing to strong persecutory anxiety and the excessive use of schizoid mechanisms.

At about the same time that Winnicott sees the infant as emerging from the symbiotic relationship and separating himself, attaining what he terms "the capacity for concern", Klein supposes the infant, given healthy development, to enter the depressive condition. Here the two

perspectives are very close: in this position, the infant, his ego now more able to integrate good and bad experiences, is more able to hold ambivalent feelings together about both the external object and himself. Thus the mother is no longer divided into good and bad objects, but is seen more as a whole person combining good and bad qualities. His awareness of his separateness and the increasing realisation of his dependency provoke anxiety about losing her, and the awareness that his own destructive feelings are directed against the object which is good as well as bad gives rise to anxiety lest his destructiveness may harm her, to feelings of guilt, and ^{to} the desire for reparation. Klein says that these factors are at the basis of separation anxiety; fear of strangers is thought to be founded on the persecutory anxiety due to the destructive impulses which are felt towards the mother being deflected onto strangers (Klein, 1952 Chapter 7). Whatever the merits of this formulation in terms of exactly which emotions are operative - and it is not intended here to give such an evaluation - the important contribution of Klein is the vital insight that both separation anxiety and the fear of strangers represent the products of a whole history of a particular relationship rather than the starting point in the formation of one; that they must be considered in interactional terms rather than in the language of the cognitive and perceptual capacities of the infant. Furthermore, the dynamic quality attests to the active nature of the infant's role in the process, rather than considering him as a mere passive recipient who does little more than register distinctions between the perceptual templates he has formed of his mother and the images presented by other people. Thus it can be seen that in the first six months of life the infant is able to engage in object relations, is seen to possess a relatively structured ego, and to have available fairly sophisticated means of regulating his experiences and his interactions, various permutations of the different defense mechanisms being possible;

all the latter aim to ward off anxiety from both internal and external sources and are seen as operating within a motivational framework which does not differ fundamentally from Freudian 'impulse' theory and the 'pleasure principle'.

Klein's adherence to the pleasure principle represents the point of departure for Fairbairn (another prominent figure of the British Object Relations school, although recognised to a much lesser extent than Klein) and this aspect of his contribution is especially apposite to the theoretical perspective taken in this thesis: his argument with Klein on this point was that he considered the ego not to be pleasure seeking, but to be object seeking (Fairbairn, 1949). This conviction was philosophically inspired by the study of J.S. Mill, who saw the necessity of a transition from a principle of pleasure seeking to explain human morality "in deference to the inexorable facts of social life". Whereas Klein only picked up the significance of Freud's concept of the superego for a theory of object relations whilst still retaining the theory of impulses, Fairbairn considered the introduction of the super ego and Freud's statement in 1930 (Civilization: Its Discontents) that "love seeks for objects" to contain the seeds of the abandonment of impulse psychology, again, "in deference to the inexorable facts of social life". However, since Freud never developed this or made it explicit, Fairbairn's objections held for the most part and were an opening for a new approach. They were substantiated in practice by his experience of schizophrenic patients in analysis (Fairbairn, 1952). He saw the problem here being not to arouse the impulses, but to release them in the context of reality and he considered the schizophrenics' especial difficulty to be in their social relations: this led him to the view that it is the relationship with the object (another person) and not the gratification of impulse that is the ultimate aim of libidinal striving. In fact, he

used the term 'libidinal' to describe the object-seeking tendency of the person, and as a corollary did away with the distinction between the unorganized "id", as a reservoir of impulses, and the ego.

Along with his rejection of the pleasure principle, Fairbairn also rejected both Freud's notion of erotogenic zones as sources of pleasure-seeking aims, seeing the zones rather as constituting "channels adapted for the fulfillment of libidinal aims which have their source in the ego and are directed towards the establishment of satisfactory relations with objects" (Fairbairn, 1949), and Abraham's theory, taken up by Klein, of libidinal phases in development based on zones. He attempted to replace this with a theory of development in terms of the nature of dependency on objects. He conceived of pathological conditions as being techniques for regulating relationships with internal objects rather than being fixations at certain libidinal phases. In fact he found that "the main features of schizoid patients are defences against the painful effects of not being loved by a parent figure with full acceptance" (Sutherland, 1963). It is interesting to note that Fairbairn sees pleasure seeking as a secondary and deteriorative principle of behaviour, occurring only in the face of frustrations and difficulties in adaptation to objects; likewise aggression is viewed as secondary rather than having the independent status of a primary instinct afforded to it by Freud and Klein. His interpretations of such pathological phenomena highlight the contrast between his Object Relations Theory and that of more classically Freudian approaches, illustrated for example in Spitz's view of the reactions of institutionalized infants to someone's approaching them (Spitz, 1962). Deprived infants turned their heads to one side and refused contact; ^{and} _^ Spitz sees this head turning as regressive behaviour ^{analogous} _^ to the rooting response with the aim of discharging tension arising from the disturbance to their state (he considers rooting to be the first directed, organized activity of the infant, having no negative

counterpart, its antithesis merely being displeasure which is unorganized, disordered and diffuse). Thus the head turning for Spitz, although possessing the quality of an interpersonal reaction in that it is linked to someone's approach, is not directed towards a person as object, but represents a regression to a preobjectal period designed to reduce tension. Another reaction of such infants was at times to go into a sleep state and he similarly regards this as regressive, derivative from the first experiences of the state of sleep with ~~sati~~ation at the breast in the anaclytic situation, and the prototype of all defenses. In short, more complex relations arise out of initially physiological drives or urges.

The contribution of workers within the psychoanalytic tradition is manifold. From a consideration of the observations of Winnicott and Klein, taken together with the theoretical perspective of Fairbairn, one arrives at a synthesis of value for current conceptions of the nature of the infant's early social relations. The most important step from this point of view is Fairbairn's development of an Object Relations Theory which went beyond orthodox Freudian impulse psychology; his conception of the libido as being fundamentally object (or person) seeking, the interpretation of pathological phenomena as efforts to re-establish object relations, and the conception of aggression and pleasure seeking as deteriorative, and stemming from frustration in attempts to achieve such relations, are insights that come close to fulfilling McMurray's stricture (McMurray, 1961) that what is needed is "a language of the personal", one that sees the attainment of full relatedness as an end in itself, rather than reducing it to non personal terms, and the infant as predisposed to actively strive to these ends. Within the context of such a theoretical perspective, the work of Winnicott has the important function of describing behaviour in the mother which, in health, meets the infant's initiatives to relate, resulting in a state of symbiotic

unity. Her "holding" is an adaptation to an actively motivated and sensitive partner of a specifically personal as opposed to mechanical nature; this carries the implication that even in an interaction in which the contributions of the partners are manifestly unequal, the infant nevertheless possesses both fine parameters of responsiveness to the mother and the capacity for initiative within the interchange. This would lead to an interpretation of the effects of experimental perturbations in terms of the disruption to the process of relating for the infant.

The most valuable aspect of the Kleinian contribution is to lend support to the observations of infant behaviour in perturbed interactions as being part of a complex process of relations established from birth onwards, and to demonstrate the infant's capacity for regulating relationships in a sophisticated way.

The Object Relations approach, as that of the theory of intersubjectivity, in recognising the essentially interpersonal nature of mother-infant interactions, would contrast markedly with the analysis we have seen presented by Schaffer and Kaye, in which nearly interactional synchrony is held to reflect only the mother's skill in fitting her behaviour into the infant's autonomous, spontaneous activity. The difficulties involved in teasing out the relative contributions of each partner are apparent from the disparity of opinion on this matter resulting from some of the observational studies. Thus, whilst Brazelton, Trevarthen and the psychoanalytic schools tend to see the process as more genuinely two-way and reciprocal from very early on, as seen above, the end result is regarded by others as evidencing only the mother's skill. Thus, what one observer sees as the mother's anticipation of the infant's behaviour (a feature noted by Trevarthen, 1979) for example, terminating her utterance as she detects the infant about to emit a "spontaneous burst" of behaviour, could be viewed by another as evidencing the infant's responsiveness to the ending of her phrase, or even, if the time interval

is extremely close or the utterances overlap, as anticipation on the part of the infant.

Given the disparity of emphasis arising from observational studies looking at the same patterns in behaviour, and with the hope that clarification might result from another approach, it was decided to pursue the investigation of these issues within a more experimental framework, in which points arising from observational studies could be elaborated, and the contributions of the two partners in the interaction disentangled. The precise questions to be investigated centred around some of the hypotheses generated in Trevarthen's theory of intersubjectivity, namely: the issue of rudimentary communicative intentionality in the infant; the infant's commitment to social interactions; the regulatory capacities of the infant within the interaction; the emotional components; the relevance of "contingent" responsiveness by the adult; ^{and} the importance of the actual form of the mother's behaviour.

It was hoped that results of these investigations would help to further evaluate (and contribute to) current theories of social development and contribute to the making of a more complete and more consistent theory.

CHAPTER 2

THE CONTRIBUTION OF STUDIES EMPLOYING PERTURBATIONS TO
AN UNDERSTANDING OF INFANTS' INTERPERSONAL CAPACITIESPROBLEMS COMMONLY ARISING IN UNDERSTANDING
EARLY MOTHER-INFANT INTERACTIONS

In our consideration so far of the way in which face-to-face exchanges between a mother and her young baby may be conceived, some confusion and diversity of opinion in the literature has been described with regard to the relative contributions made by each partner to the conversation-like outcome of their encounters. Such differences have been particularly hard to reconcile from superficial observations of very young infants. In turn, the conflicting views on this particular issue can be related to the broader one, considered in the Introduction, of establishing the sense in which a young infant may be thought of as a social or personal being. Winnicott's descriptions (Winnicott, 1965) of mother-infant interactions help to clarify the reason for the particular difficulty in disentangling the two participants' contributions at this stage: the mother's and baby's acts may be enmeshed and interlocked early on, with the mother's empathy and state of 'primary maternal preoccupation' allowing her to complement and complete the baby's initiatives to such an extent that only when something goes wrong do the separate processes become more clearly apparent. One way of resolving such issues may well be, as Trevarthen (1977), or Oster and Ekman (1978) advocate, to attend in even greater detail to the morphology of the participants' actions. Whilst attempting to achieve this, ^{and} because of the enormity of the task which would be necessitated by relying on this approach alone, it was decided, following an approach indicated by Winnicott above, to look to disruptions as a source of clarification.

The Contribution of the Study of Naturally Occurring Perturbations

One would obviously hope that serious and destructive violations to the mother-infant relationship are at the most rare occurrences, but when there has been opportunity to study those that do come about, the effort has certainly yielded valuable information about how the processes we are considering control the normal interaction. Thus, the importance for the infant of his mother's behaving responsively and appropriately to him has been implicated in several observational studies of deviant pairs; for example, Papousek (1975) reports the observation of a dyad where the mother was psychotic and her actions were neither synchronised nor responsive to the baby's acts. Here the infant is described as having responded to the mother's incomprehensible behaviour and having made attempts to get back into contact with her. Brazelton (Brazelton et al, 1975) notes a four-week-old baby's avoidant responses to his congenitally blind mother's expressionless face, and the Robertsons (1963) record two infants, each of whose mothers withdrew briefly from them emotionally (in one case the mother also withheld her physical care), when they were eight weeks old. One infant reacted by becoming very withdrawn and apathetic after a period of protest; the other developed and maintained a restlessness and the expression of pleasure in an extreme and precocious form, this having enabled him to penetrate his mother's initial withdrawal to some extent.

Limitations of this approach to the problem

The study of such naturally occurring perturbations can, then, offer important evidence of both the sensitivity and expectations of the infant to various aspects of the mother's behaviour, and also the infant's adaptive capacities in the face of such situations. However, not only are such opportunities for study infrequent, but, even when they do

present themselves, the same confusions can still arise as to the role of each partner as in the study of happier dyads. This is particularly likely to be the case when the observer goes into a situation which already has a developmental history of some weeks, months or even years. Until either good predictive indices are developed or, as noted above, the morphological descriptions achieve the necessary finesse, or else some method is found of opening up the relationship, and it is hoped to show in the course of this thesis that this now exists, the location of origins and effects may remain problematic unless we are to depend on chance enabling one to take up observation at the unfolding of a style of relationship later classified as deviant. The difficulties are illustrated in a study by Stern (Stern, 1971) who describes an infant whose mother appears over-controlling with him, such that when the infant turned away from her, rather than taking this as a cue for the termination of that interactive sequence, the mother would only intensify her efforts to engage him. The interesting feature to note here is that Stern points out that there may have been something in the nature of the infant's looking away which prompted the mother to continue her efforts, since this infant seemed to continuously monitor his mother peripherally and to keep up a response to her that way, rather than clearly cut off his regard as did his twin, and this may have cued her to pursue her approaches to him.

Experimental perturbations in the context of sensitive observations

Bearing in mind the disturbing effects of experimental approaches (see Trevarthen 1977 and pp. 10-11), it was nevertheless felt that experimental perturbations within the context of a detailed study of ordinary face-to-face interactions would get round some of the difficulties posed by relying solely on the study of naturally occurring violations, and might elucidate some of the existing confusions and

allow one to establish more clearly certain of the baby's interpersonal capacities. This approach has of course a distinguished tradition in the field of experimental biology where it is applied to test control in a dynamic system. In the area of human cognitive and perceptual development such a methodology has been fruitfully employed by Bower and his colleagues (Bower, 1974) to establish intentions and perceptual expectations in the infant, and even quite complex cognitive processes, as evidenced by changes in measures of surprise, distress or changes in facial expression and reaching behaviour when the baby is confronted with perturbations to, or changes in, the physical environment.

Some experimental manipulations involving disruptive effects, while not specifically addressed to the problem of establishing the nature of capacities inhering in the infant in the context of interactions with others, nevertheless illustrate the potential value of such techniques for elaborating various aspects of the infant's interpersonal, cognitive and emotional capacities. Thus, certain parameters of persons have been established to which infants are sensitive early on, or which they seem to expect to be present. Perhaps the earliest recorded experiment of this kind was that performed by Darwin (Darwin, 1877) who noted his $4\frac{1}{2}$ month old son's "grave and much surprised" appearance, which would have led to crying, when Darwin approached the baby with his back turned towards him. More recently Aronson and Rosenbloom (1971) found that infants from 5 to 8 weeks old became distressed at the sight of their mother when her voice was displaced to one side so that it no longer seemed to emanate from her mouth. Carpenter concluded that the individual voice quality of the mother quickly becomes associated with her appearance, since, even by two weeks, if the mother's voice appeared to come from a stranger, or vice versa, the infants showed gaze aversion (Carpenter, 1975).

In the tactile-kinaesthetic mode Widmer and Mounoud found infants in the first month to discriminate according to whether their mother or an experimenter held and rocked them in the dark (Widmer, 1979). Young infants have also been shown, through experimental manipulations, to be sensitive to abnormal aspects of a person's appearance. Sander (1973) found that seven day old infants' sleep and feeding rhythms were disturbed if their mothers were wearing masks. In Carpenter's study quoted above, infants from 4-8 weeks showed gaze aversion, as well as fussing to the target with their eyes wide open, if their mother looked at them through a port-hole in a screen, more so than to a stranger in the same situation, whether shown a still face alone, or whether the person was moving and sociable. Papousek and Papousek (1975) reported infants to lose interest in their mothers if a perspex screen with transparent horizontal stripes is placed between them.

Not only have sensitivities to irregularities in visual, auditory and tactile cues been demonstrated, but also similar changes in the form of the baby's behaviour - generally involving looking away from the partner - have occurred upon disruption of interactive variables. Thus Brackbill (1958), in a conditioning study of smiling in four-month-old infants as a function of social reinforcements, found that in the extinction phase, when the experimenter stopped being responsive to the baby's acts, the baby's rate of smiling decreased to zero; it did not stop at the previous operant level. There was, moreover, a conspicuous behavioural change: protests increased and the baby would no longer look at E's face, but would turn his head to one side and remain in this position. If he was prevented from turning in this manner, his eyes would turn up to the ceiling to avoid E's face.

Similarly, in Rheingold, Gewirtz' and Ross's study of the social conditioning of vocalisations (Rheingold et al, 1959), it was found that

when, in the extinction phase, the social reinforcement stopped, and instead the experimenter leaned over the cot with an expressionless immobile face, as well as the vocalisation levels decreasing, a greater number of what they term "emotional responses" occurred, including protests, fussing, crying and looking away, or self stimulatory acts which seemed to be attempts to avoid E. Koch (1967) found it difficult to reinforce 2 month olds' head turning with presentation of the mother's voice and face; as the sessions went on the infants behaved in a negativistic way and did not turn their heads towards their mother, or even turned away from her; actively resisting attempts of the experimenter to turn their heads towards her; and their mood deteriorated with restlessness and crying. On the other hand, presentation of a stranger produced no such drastic effect and it was possible to get conditioning to the appearance of different toys, and to a stranger picking up the infant and cuddling him. Stechler and Latz (1966) found presentation of a still, live face to provoke an avoidant reaction of a very deliberate quality; an infant of 17 days avoiding the face 85% time, whereas a profile presentation was only looked away from for 38% time, and a pattern 3%. Likewise Wolff (1969) found that presentation of a silent, nodding face to a fussy baby in the third week produced crying which stopped when the face was withdrawn.

Papousek and Papousek (1975) found the same kind of avoidant reaction to occur when the mother tried to resume contact after repeated incomprehensible absences - the room being plunged into darkness whilst she left. But if she repeatedly left in sight of the baby, doing so in natural and characteristic ways, the infants did not show this reaction on resumption of her presence. Control experiments showed the effect not to be due merely to the darkness. Tatam (1974) found with three nine-week olds, that if the mother's speech became both unrelated to the infant's behaviour, and also changed in style so that it was

adapted to talking to another adult to whom she was attending via a reflecting surface in front of the baby, similar reactions occurred; and he notes ^{that} the quality of the infant's affect changes becoming eventually "depressed".

Experimental studies have generally elucidated the infant's considerable social capacities in two respects: firstly, they have established the infant's sensitivity to various attributes of other persons from the first few weeks of life ^{have} and shown constraints on what is treated as acceptable by the infant, thus bringing to light the infant's expectations about the qualities of people. The degree of discrimination shown and the apparent specificity of expectations tend to support a theory of intersubjective capacity and the view that the infant is preadapted to other people as such.

Apart from helping to establish parameters of the infant's sensitivity, a second way in which these studies contribute to an understanding of the infant's interpersonal and regulatory skills is to draw attention to consistent patterns of behaviour in the infant which occur in the face of these natural and experimental disruptions; behaviour described in several accounts in terms of its intentional, deliberate and, moreover, emotional quality (Brackbill, 1958; Koch, 1967; Rheingold et al, 1959, Brazelton et al, 1975). The significance of this consequence of disturbed communication is discussed below in Chapter 3 (p. 56).

Limitations of the experimental work done so far

There seems to be a fair measure of agreement among the authors quoted above that they are referring to a common phenomenon in their separate accounts of the infant's reaction to the different disruptions they describe. Although no claims are made as to invariant relationships between a given behaviour and its meaning, since these evidently may be

multiple, (just as multiple behaviours may serve the same interior function or motive) it seems plausible to assume that the phenomenon of gaze aversion noted above may bear at least a close relationship to other descriptions of behaviours described which both incorporate gaze aversion as a key element and share common situational variables (e.g. those of Spitz, 1962, Hutt and Ounsted, 1966; Chance, 1962; Tinbergen, 1972; Main, 1975).

Notwithstanding the degree of similarity in the descriptions given, the studies quoted above have failed to establish the precise sense in which the mother's (or other partner's) behaviour during the perturbations is disruptive for the infant: several alternative explanations have been proposed that have important and differing implications for the degree and kind of interpersonal capacities which can be attributed to the infant. For example, one frequent explanation (to be outlined in more detail below) is that the infant is simply disturbed because the mother's behaviour is abnormal or unexpected along some physical dimension. Such an explanation could possibly be applied in the case where the mother's voice is displaced away from her mouth when she talks to her baby (Aronson and Rosenbloom, 1971) or where her face is partially occluded but she remains responsive (Papousek & Papousek, 1975). This represents a relatively weak or reduced claim for the social capacities of the infant, for it does not necessarily lift him from the position of a passive receiver of distal stimulus qualities (even though fine discrimination may be shown).

In other cases, the nature of the disturbance is not so clear, and it is claimed that the effect is due to more relational qualities being disrupted; that is, the infant is distressed because he is not able in several of these perturbations to establish a relationship between his own acts and the behaviour of the other person (e.g. Brazelton et al, 1975; Tatem, 1974; Brackbill, 1958; Rheingold et al, 1959). This interpreta-

tion is complicated by the fact that the disruption to the relational or interactional quality has invariably entailed changes in the physical dimensions of the partner too. This kind of explanation goes further than the former to expose complex mental processes in infants since it considers the infant to be more actively participating in the course of exchanges with other people, as well as being sensitive to their dimensional attributes. The observations on the emotional and intentional quality of the infant's reactions would seem to support this more generous interpretation, reflecting a potential in the infant both for the active adaptation to communication and also a commitment to engage in interactions with other people.

Inferences Concerning Infant Motivation from Perturbation Studies

Some of the most prominent explanations for disturbed behaviour in infants when their interactions are interfered with experimentally are outlined in more detail below.

1) The discrepancy hypothesis

A common view is that the instigating factor in the perturbations is the violation of the subject's expectations. This kind of interpretation is often explicitly linked to the motivation theories of Hebb (1946, 1955), Hunt (1963, 1965) and Berlyne (1960, 1966). The relevant points can be stated as follows: according to Hunt, infants under 4-5 months of age are mainly responsive to changes in ongoing stimulation. As the coordination of reflexive schemata is gradually achieved by association, so standards or images of stimuli become built up and stored. Distress arises at the absence of the familiar, and intentions evolve to recreate familiar patterns. A motive arises to achieve a match between the patterning of the internal image or standard and the pattern of reality. The degree of disparity constitutes a measure of incongruity for which there is supposed to be an optimal level inherent in the organism's informational

interaction with its circumstances. This type of explanation has also been advanced to account for 'stranger fear' - Schaffer (1966, 1975).

Hebb (1946), too, sees avoidant and fearful reactions as determined by some discrepancy of the current input from that which has previously been frequently experienced by the subject - leaving an image or schema. An essential feature of fear-producing situations is, then, their divergence from a familiar group of objects which still have enough properties to fall within the same class. Avoidance averts or minimizes the disruptive stimulation. Later Hebb (1955) built the concept of arousal into this formulation, and proposed an optimal level of arousal for behaviour and for the cue functions of the stimulus to be effective. If arousal is low, a stimulus which increases it will tend to be repeatedly sought; if arousal is high, irrelevant behaviours may occur and the cue function of the stimulus be interfered with.

According to McCall and McGhee's (1976) and Kagan's (1975) statements of the discrepancy hypothesis (after Berlyne, 1960, 1966) an organism attends to and affectively responds to new stimuli as an inverted U function of the stimulus's physical or conceptual discrepancy from a well-familiarized standard stimulus. If the stimulus is familiar for the infant he is thought to scan his memory for relevant engrams. This attempt at identification is held to engender subjective uncertainty which is aversive and leads to negative affect (Berlyne, 1966). If the degree of discrepancy is great, then attending to the stimulus is thought to interfere with the scanning process and the infant looks away as new information is not required and may disturb the memory search. But once an initial recognition of the schema or engram occurs it is checked out and evaluated against the new stimulus, and looking resumes.

Carpenter (Carpenter, 1974) and Stern's (1974a) work represent the clearest application of this theory in their explanations of the perturbed

behaviour and gaze aversion in early interactions described above. The mother's behaviour during the perturbation period, then, is seen as disturbing because it departs from the schema or standard of her which the infant has learned through his frequent unperturbed encounters. Thus Carpenter (1974) suggests that the sight of the stationary mother is more aversive than ^{that of} the moving one because the mother has come to be associated with a certain variety of sensory stimulation; thus when she is moving this is less discrepant from the standard. The infant's turning away (see Carpenter, 1975 too) is supposed to reflect a cognitive process of matching the current input of information against the expected information. Attempts are made, in alternating the gaze, to keep the visual input commensurate with his ability to process the discrepant information.

According to Stern (1974a) the infant's arousal level is a function of the discrepancy between the stimulus variables in physical dimensions provided by the mother (e.g. the intensity, duration, speed of changes in the way she is perceived) and the infant's schema for her; this having dimensions in space and time. Stern states

"... we hypothesize that as the intensity or complexity of the stimulus increases, or its degree of discrepancy from the established schema becomes more pronounced, it will command more and more attention and arousal, which is often accompanied by positive affect. However, when the point of intensity or complexity or discrepancy exceeds the forming schema so that the upper limit of an optimal range of arousal is passed, the infant turns away from the stimulus often with signs of aversion and the level of arousal is reduced."

This leads him to define social play tautologically, as "the mutual regulation of stimulation in order to maintain some optimum level of arousal which is affectively positive". (Stern, 1974b).

The germ of this kind of explanation is also apparent in the interpretation of Koch (1967), that the failure to obtain conditioned head turns to the appearance and voice of the mother resulted from the fact

that "here her appearance was not connected with other activities" - e.g. feeding, bathing, carrying, which normally would occur at the same time. Aronson and Rosenbloom too (1971) see the infant's distress at the separation of voice from appearance as due to the "violation of the young infant's perceptual world."

2. Motivational conflict

Other accounts of this kind of phenomenon, which tend to be influenced by ethology or psychoanalysis (both of which have, in the past, explained behaviour in terms of a hydraulic model of drives) have proposed an induced motivational conflict between tendencies to approach and withdraw. In the ethological literature this can be related to such theories as those of Tinbergen (1952). He explained the rapid pendulum type alternation of the expression of attack and retreat in situations such as disputes between animals at the boundaries of their own territories in terms of the two tendencies to attack and to flee being released together, neither of which can find complete outlet in behaviour since the two are incompatible. In 1972, likewise, he and his wife claim that many communicative movements are caused by motivational conflicts. For example, in herring gull bonding, much of the female's behaviour is thought to be due to the simultaneous elicitation of two behaviour patterns that are wholly or partly incompatible. This kind of explanation is extended to account for stranger fear in human infants and the ontogenesis of autism (see too Bateson, 1956, and Klein on the paranoid-schizoid position, p. 32).

In a similar way Chance (1962) describes what he calls "cut-off" acts occurring in situations where contradictory messages are conveyed between animals, including those where a motivational conflict between an aversive drive (flight or aggression) and attraction occurs. This type of explanation is taken up by Main (1975) and in part by Tronick et



al (1975, 1978) in their accounts of perturbed infant behaviour. Main suggests that avoidance of a "primary attachment figure" occurs in conflict situations where affectional attraction competes with tendencies to attack and/or withdraw. She suggests (after Bowlby, 1969) that alarming events impel a child to approach the attachment figure. In the case, however, where the alarming event stems from the mother - e.g. a rebuff to the child's efforts to keep in touch with her by behaviour such as looking to her - the same signal which drives him away from her also drives him to her. If this happens the infant is obviously in conflict and in consequence avoids his mother.

Tronick et al (1975, 1978) suggest that if the mother appears full faced but unresponsive to her baby her presence communicates readiness for interaction which induces approach, yet her non-responsiveness indicates disengagement or withdrawal. The infant is trapped in the contradiction, and shows an approach-withdrawal pattern of behaviour.

The proponents of this point of view also stress the apparent appeasement and regulatory function which gaze aversion has between conspecifics, bringing about a resolution of the conflicting drives, or drop in arousal level so that a resumption of the interchange becomes possible. This function has also been proposed for the role of protests or distressed behaviour found often to accompany gaze aversion (Carpenter et al, 1970; Papousek & Papousek, 1975; Rheingold et al, 1959, Brazelton et al, 1974, 1975; Brackbill, 1958; Tatam, 1974; Aronson and Rosenbloom, 1971).

3. The violation of reciprocity: (I) In terms of "contingent responsiveness"

Another kind of explanation given for the infant's distress and gaze aversion during the perturbatory period, and one often combined with the first, is that the infant has an expectation or requirement

(either acquired - Carpenter, 1970, 74; or innate - Brazelton et al, 1975; Tronick et al¹⁹⁷⁸ for reciprocity of behaviour with the partner. This concept is at times ill defined, but is sometimes expressed as contingent responsiveness or reinforcement on the mother's part to the infant's acts of the kind described by Papousek (1975, 1977), Watson (1977) Lewis and Goldberg (1969) and is related in the latter account to White's theory of competence motivation (White, 1959). Models of expectation for contingency are developed by the infant through repetitions of the same stimuli as a consequence of the subject's acting; the model retaining such information as intensity, duration and quality of stimulation. In the experiment described above (p.45) Papousek (1975) likens the baby's reactions to the mother's incomprehensible disappearance to the reactions seen in experimental problem-solving situations with physical stimuli, when the infant cannot discover the correct solution, and where the dependency between his own action and environmental events is too difficult to perceive. As in the other accounts above, active avoidance protects from overstrain and controls the supply and processing of information.

In Stern's analysis (Stern, 1974a) the nature of the contingently responsive reciprocity is held to inhere in the requirement that the mother adjust the complexity, intensity, etc. of her behaviour to the infant's level of arousal and accompanying affect.

This, and the discrepancy theory, attempt to explain the feedback support given to the infant entirely in terms of the mechanical repetition of responses by the mother to acts that the infant makes. The physical dimensions of the mother's stimulus properties, and the timing of her reactions, are considered sufficient to explain the observed interactions.

In other theories the psychological processes of the infant are held to give a more complex form of representation to the mother's actions. This leads to a different explanation of disturbances in perturbed

interactions:-

4. The violation of reciprocity:
 (II) The violation of the reciprocal regulation
of intersubjective communication

Rather than reciprocity being identified purely in terms of physical characteristics, such as contingent timing of the mother's acts on the infant's, or the regulation of parameters of her "display" such as frequency, intensity, degree of complexity to fit the infant's arousal level or schema for her, it is suggested here that the infant in these perturbations may be disturbed by a kind of reciprocity which, while incorporating elements of timing and physical characteristics, cannot be reduced to this low order level. The difference here is similar to that described by Winnicott (see p. 29) to distinguish between good mothering and responsiveness that could be provided by a machine.

A theory of an intersubjective capacity in the infant assumes, as has been outlined in the Introduction (pp. 22-27), that infants are equipped in the first weeks of life both to perform actions which have rudimentary intentional structure, such as scanning or prefunctional reaching movements, but also ^{that} they are able to perceive such qualities in others' actions; to perceive attentions and intentions in the actions of other voluntary agents and the direct perception of emotional expression. Moreover they are held by this kind of theory to be motivated to regulate their communicative acts with those of others. This theory has been applied by Tatam to explain the infant's distress in the perturbation he arranged. It is suggested here then that what may be disruptive in several of the experiments and situations above is that either the infant is unable to achieve the joint regulation of communication, and/or that the usual structure of coordinated intentional activity in the mother is disturbed.

Although they are not clearly defined and explicated, the main arguments in Brazelton and Tronick's accounts appear to coincide to some extent with this analysis. Implicit in their suggestion that the infant is conveyed contradictory messages in the still face condition is the idea that the infant is upset because he fails to establish a mutual, reciprocally regulated interaction. They propose that the infant has an expectation for rhythmic interaction and that the mother's still face represents a distorted response to the infant's initiatives and greetings and state that the goal of the infant is to reciprocate in an affective, synchronous interchange.

It can be seen then from the work quoted above that studies employing perturbatory procedures have made a considerable contribution to the understanding of the capacities of infants in interpersonal exchanges, in that they have revealed the sensitivity of infants to a range of qualities of other people. However, it has also been shown that up until now it has not been clearly established whether infants can be sensitive purely to the progress of their communication with others, as suggested by intersubjectivity and conflict theories, or whether disruptive effects can invariably be analysed in terms of alterations to physical dimensions or relationships in time.

Before going on to outline the work carried out here, in which an attempt was made to resolve these issues, the other aspect of the contribution of these perturbatory studies is considered - that of highlighting the emotional quality of the infant's reactions.

CHAPTER 3

EMOTIONALITY IN INFANCYTHE PLACE OF EMOTIONAL EXPRESSION IN INTERPERSONAL EXCHANGES

The emphasis in the analysis in the previous Chapter on the importance of emotional expression in interactions brings us back to the second way in which it was felt that the perturbation studies have contributed to an understanding of infant's interpersonal relations (see p. 46) that is, the consistent reporting of clear expressions of emotion.

Investigation of the interpersonal emotional capacities of the infant, in the context of interactions with others, has not been the main concern in many of the experiments outlined above, which have been intended to measure conditioning of infants or to examine their perceptual capacities and preferences. Although these studies have succeeded in establishing the infant's sensitivity to various aspects of other people, and in order to do so have repeatedly relied on expressions of affect such as surprise and interest to determine parameters of cognitive functioning (See Sroufe, 1978; Haviland, 1975), the form of the infant's adaptive reactions has, on the whole, been of secondary interest. Descriptions of the behaviour have been given presumably because of its obvious and dramatic quality, yet they have been incidental to the main purposes, and have tended to be of a rather general kind. Furthermore, no theory has been adequately developed, out of this work, of the place of emotional expression in personal relationships. Indeed, since the diary studies of the nineteenth century and Darwin's pioneering work, the perception and expression of emotion in early infancy has received scant attention, as the review of Charlesworth and Kreutzer (1973) makes clear.

THEORIES OF EMOTIONALITY IN INFANCY

One current and prevalent view asserts that the form of human emotional expression is at first, and for a few months, extremely limited and disorganized, but becoming increasingly well articulated and differentiated through development. For example, Sroufe (1978) describes early emotional expression as a diffuse total body reaction, only later becoming directed and coordinated. Likewise Pine (1976) considers that initially there is only a relatively automatic range of pleasure-unpleasure, and Freedman (1976) too endorses this view, seeing a development towards complex and elaborate functions from processes which are both simpler and qualitatively different. Bridges' work (Bridges, 1932) has been of seminal influence in this field. She considered the earliest emotional reactions to be very general and poorly organized responses, under one month there being only the dimension of excitement and quiescence, a vague emotional response of general agitation. One by one, general emotional states are held to become differentiated.

Emde (1976) also considers the first reactions diffuse and unorganised. Contrary to Oster's interpretation (Oster, 1978) of the pre-smile browknitting as indicative of cognitive processing of the environment, he sees the same event as reflecting a 'response equivalence' for frowns and smiles: all systems, he feels, react together, resulting in diffusion and homogeneity.

This approach is exemplified, for example, in conceptions of the development of fearful reactions. Fear, along with other emotions such as surprise and anger, is often thought to become a prominent or 'real' reaction only in the second half of the first year (Scarr and Salapatek, 1970; Sroufe, 1978; Schaffer, 1966; Emde et al, 1976), in spite of the fact that behaviours considered to be constitutive of fearful reactions have frequently been noted to occur in young infants in

the face of the perturbations described above - i.e. "distress and physical attempts at avoidance in the face of specific patterned environmental stimuli" (Emde et al, 1978) or "Fear proper betrays itself in the stare, the grave look, and in such movements as turning away and hiding the face" (Sully, 1896).

Part of the reason for this interpretation is possibly the inordinate emphasis given to fear of strangers as a paradigm; and this brings us to the second aspect of theories of emotionality to be considered here, i.e. views on the nature of eliciting circumstances.

Just as the form of the very young infant's emotional responses has been thought to be simple and global, so, too, have the situations that provoke such emotional displays. In particular, a common theme is that stimuli are at first relevant in their quantitative aspects: only later do content and quality become relevant variables. Thus Sroufe, in his review of theories of the development of smiling, considers that at first internal state is of paramount importance: early smiling is a "completely passive process", reactive to stimulation sufficient to jog the N.S., "stimulation increases the level of sensory excitation, and the smile comes with subsequent relaxation". Tension seems to derive primarily from stimulation rather than processing of the stimulus configuration, "there is little specificity of stimulus content". It is not until three months that there is any active transaction with the environment, and only then is it the case that "psychological processing of the stimulus content leads to the smile which may be supposed to indicate pleasure" (*ibid*). With regard to negative affect Sroufe similarly assumes that at first high intensity of arousal leads to distress; for example, as a consequence of sustained head restraint, where there is "an event having a certain insistence and duration to give sufficient tension load to produce unbroken arousal".

Bridges (1932) sees a progression to more specific provoking situations. Under one month she lists as typical stimulation eliciting the excitement state - sun in the eyes, suddenly being picked up, holding of the arms tight to the sides, a loud clattering noise and rapping on the knuckles. After one month the major causes of the newly differentiated distress are held to be physical discomfort, pain and hunger. At three months, when a temper reaction is thought to emerge, situations provoking this state are thought to involve a stop or check in the progressive satisfaction of a physical need. Not until four months are more interpersonal factors considered causal in negative reactions, although in the area of positive affect she describes fleeting smiles at two months as being elicited by such events as nursing, patting or being spoken to.

With regard to fear, ^{it is frequently assumed,} as mentioned above, not to be operative in any genuine sense before seven - nine months. Prior to this there is merely a reaction to 'primitive' stimuli or sudden unexpected events (Schaffer, 1966). Emde feels that before this age there is fear of a nonspecific nature which is most commonly associated with pain and hunger. Apart from internal causes, only levels and changes in stimulation are thought to be relevant to induction of fearful reactions; content is, as with the social smile, unimportant until after three months.

It can be seen in the discussion above that in addition to the various requirements of changes in internal state or surface expression, cognitive evaluation of the content of the environment, and specificity of response in relation to circumstances have been commonly adopted criteria for designation of true emotional experience. Furthermore, in the various statements put forward above, this is not accepted to be the case, until at least three months for pleasure and nine months for fearful reactions. Other criteria have also been suggested to define

attainment of a capacity for emotion which bear close relationships to those outlined in the Introduction for the status of a truly social being (see pp. 4-8), i.e. the achievement of a basic differentiation between self and other (Sroufe, 1978; Freedman, 1976); the capacity for self-awareness and discrimination of one's state (Lewis & Brooks, 1978; Sroufe, 1978) and an interpretation of one's state which is at least partly influenced, if not created, by the evaluations of others (Lewis & Brooks, 1978). The position outlined above contrasts markedly with Darwinian theory which, as Charlesworth and Kreutzer point out, has perhaps been most neglected in the field of emotional expression. The importance Darwin himself gave to this aspect of human nature has been almost disregarded for more than 100 years.

Darwin's Contribution

Form of expression: Darwin considered that man is innately endowed to express a very wide variety of emotional states, this capacity arising in evolution, from the operation of three principles. The first is that a certain state of mind would originally have led to the voluntary performances of functional movements; these have become associated through 'habit' down the generations; and now, even though no longer necessarily functional, the movements occur when the same or analogous emotional state or sensation is experienced. The second principle of antithesis holds that movements opposite to those acquired in the way described above will be performed when an opposite state of mind occurs. The third is that of the direct action of emotional states on the nervous system, independent of the will or habit.

Sensitivity and perception: Not only did Darwin make claims about the rich and innate expression of emotion, but he judged its perception and understanding to be no less important --

"An infant understands to a certain extent, and as I

"believe at a very early period, the meaning or feelings of those who tend him, by the expression of their features."
(Darwin, 1877)

Those following on the Darwinian tradition have generally not considered the criteria for subjective emotional experience to be problematic, and have treated the surface expression as directly indicative of experience, particularly in infancy (e.g. Izard, 1971; Oster, 1978; Trevarthen, 1979).

Psychoanalytic Views - Object Relations School

The influence of these ideas from Evolutionary Theory is apparent in psychoanalytic thought, and particularly in the work of the British Object Relations school. Here there has been a readiness to attribute an in-born sensitivity in the infant to the emotional states of caregivers, and to the ongoing process of interaction with them, and also complex adaptive responses with clear emotional components from the first weeks of life (Robertson, 1963; Winnicott, 1965; Klein, 1952). For example, Klein holds ,

"... the essential qualities of the more mature individual are identifiable in the neonate and the characteristics one sees in the former are best understood as elaborations of the already present abilities of the latter. Thus one assumes internal drives, inherent capacities for affective experience, already formed psychic structures and the ability on the part of the individual to identify and respond to objects as though they, and the objects had psychologically separate existences." (Klein, in Freedman (1976))

Intersubjectivity

This view is largely compatible with the interpretations outlined above (pp.51, 54-55), which put motivational conflict or a violation of intersubjective relations as causal in some perturbed infant behaviour. Brazelton, Tronick et al and Trevarthen, as noted previously, all consider the infant to be sensitive to the emotional expressions of others and able to perceive communicative intentions. On the expressive side they

regard the infant as equipped with a wide range of communicative and emotionally expressive acts which, moreover, are held to be actively adjusted to the behaviour of the mother and regulated to achieve the goal of affective synchrony and intersubjective exchange.

Contingency theory

Some contingency theorists have also emphasised the emotionally expressive acts accompanying the achievement of predictive control or its failure - e.g. Watson records in an infant of 2 months 11 days, "delight and ready attention so marked that I noted the feeling of confronting a sophisticated subject". In a study looking at infants' reactions to contingency mobiles he observed exuberant smiling and cooing if the infant (8 weeks) had control. Papousek's conditioning studies have revealed complex coordination of adaptive and emotional behavioural changes, functioning to communicate with the environment, the congruence between expectation and outcome giving pleasure, manifest in "a relaxed facial expression, smiles and quiet vocalization accompanied by quiet and well coordinated motor activities with open palms". On the other hand, incongruence produced upset, the infant displaying a "fussy face and vocalization or crying, accompanied with uncoordinated and chaotic movements, usually with firmly closed fists". Again, considerable sensitivity to congruency is proposed, along with deliberate adaptive emotionally expressive acts to try to regulate relations with the environment.

CHAPTER 4

EXPERIMENTAL TESTING OF INFANTS' INTERPERSONAL AND
EMOTIONAL CAPACITIESAIMS OF THE PRESENT STUDY

In the context of the differing views on the emotionality of infants, and the differing interpretations of the causal factors in perturbed behaviour, the aims of this part of my research were basically twofold. Firstly, I wished to try to elucidate the sense in which perturbations such as those described above may be disruptive - either because of any abnormal quality in the mother in terms of physical characteristics, in her appearance, intersensory coordination, voice quality, etc., or else because the infant is unable to get a reciprocal interaction with her, and so establish more clearly the infant's early interpersonal skills. This was intended to be achieved by varying and refining the nature of the perturbations.

The second interest was to give a detailed account of the form of the baby's behaviour during the perturbations and to compare it with that found in successful exchanges and so help to evaluate the different views on emotionality in infancy. It was hoped that this contribution to the study of the regulation of interpersonal relationships would also have benefits for persistent problems in the field of personality differences and pathology: in infant psychiatry, according to Cytryn, (1976) there is a lack of satisfactory clinical method for highlighting both abnormal and normal personality traits in infancy, there being no uniformly adopted, standardized method for the psychiatric evaluation of infants which could serve to bring out consistencies in personality and thus provide a basis for later comparisons. Yet he suggests that defence proclivities or patterns of dealing with anxiety may be manifested very early, and can reflect the child's reaction patterns in a way which can

simply be categorized. Likewise, within a psychoanalytic framework, Korner and Grobstein (1976) feel that the manner in which the infant copes with anxiety producing situations such as hunger or overstimulation may reveal very central attributes, there being, they suggest, rudiments in each child which will make the adoption of certain defence mechanisms more likely than others.

EXPERIMENT I: A PRELIMINARY STUDY OF THE INFANT'S REACTIONS TO A 'BLANK-FACE' PRESENTATION OF THE MOTHER

With the above aims in mind, two situations were devised. The first was designed to allow detailed examination of the form of perturbed behaviour in the infant in comparison to that found in normal face-to-face encounters. On the basis of work already quoted in the literature (Brackbill, 1958; Rheingold et al, 1959; Carpenter et al, 1967, 1970), a manipulation was arranged which seemed likely to evoke clearly perturbed behaviour. For a short period (about 45 seconds), within the context of a normal face-to-face encounter, the mother became unresponsive and still faced whilst continuing to look at the baby's face. At the time that it was decided to conduct this experiment, the work of Tronick et al (1975, 1978) and Brazelton et al (1975) who report the same manipulation with similar aims, had not been published.

Subjects

The subjects were five infants, three boys and two girls, and their mothers. The infants' ages were between $5\frac{1}{2}$ and 7 weeks. Contacts previously established in the laboratory with health visitors and a local maternity hospital were used to recruit the mothers. All were British and from social class II and III. All had uneventful pregnancies. The infants had had normal deliveries.

Apparatus

The positioning of equipment and subjects was the same as that for

the mother-infant observations described in detail by Trevarthen (1977). The mother sat opposite her baby who was seated in a chair especially designed to give support yet allow freedom of movement of arms and legs, the head being supported on each side, and a wide band worn across the stomach. A mirror was positioned beside the baby so that a reflection of the mother's head and torso appeared alongside the baby in the camera view. A Bolex 16mm cine. camera in the adjoining room was aimed along a line over the mother's right shoulder to obtain a view of mother and baby almost full face. This view also included part of the mother's profile so that it was possible to judge the direction of gaze between mother and infant accurately. One hundred feet of Kodak Tri X reversal film was run at 24 frames per second, giving about 2 minutes of film per session.

Procedure

Times for all visits to the laboratory were arranged to suit the baby's schedule, the mother estimating when she thought it likely that the infant would be alert and contented.

The mother and baby pairs were transported by taxi to and from the laboratory. Provision was made there for the baby to be fed and changed. The mother was offered coffee and it was generally attempted to create a warm and relaxed atmosphere. Mothers were invited to take their babies and look around the room where the filming was to take place. When the mother felt that her baby was in a contented, alert state which she judged would last for about $\frac{1}{4}$ hour at least, the experimental procedure began.

Instructions to the mother

No specific instructions were given to the mother as to how to behave in the normal conditions (I and III), she was simply asked to "chat to her baby" as she would normally do. She was told that a white

ball suspended just behind her baby's head, operated from the adjoining room and out of the baby's visual field, would be moved up and down at some point during their interaction, and that at this signal she should become unresponsive and still faced until she saw the ball move again.

Mother and baby were shown into the room where they would be filmed, the baby strapped into his/her infant chair and the mother's position adjusted to achieve the correct line-up for the camera. They were then left alone together.

Condition I

The mother chatted to her baby: after at least a minute, and when they had established an interaction and the baby seemed to be concentrating on the mother, cine filming began and ran continuously for the rest of the session.

Condition II

At the end of a period lasting approximately 20 seconds of Condition I the infant still appearing to be attending to the mother, the visual signal was given to the mother which had been pre-arranged as indicating to her that she should become unresponsive with an expressionless, immobile face but continuing to look to her baby's face. This condition lasted for approximately 45 seconds.

Condition III

The mother was signalled in the same way to resume normal contact with her baby for a few minutes. This condition lasted approximately 35 seconds until the cine film ran out.

The session was immediately stopped if the baby became considerably distressed. This in fact happened in two out of the five sessions with the result that the third condition in each of these cases was terminated after only a few seconds.

Further variability in condition lengths across sessions also resulted from a calculated dependency of treatment on the infant's being attentive to the mother at the end of condition I. It was thought important to be able to observe the baby's reactions to the change in the mother's behaviour and therefore the start of condition II was delayed until the infant resumed his attention to the mother if it had strayed during condition I. The unpredictable variability in this factor therefore determined the length of condition III, since the total session length for analysis was permitted to last only the duration of one cine film (2 minutes).

Analysis of data

The behaviour recorded on the cine film constituted the data for analysis. Vocalization records were not taken for the baby and neither was the mother's speech recorded; it was thought that the wealth of data provided by the film rendered any audio analysis superfluous to fulfilling the aims of the study.

Forty-two behavioural acts were selected which fell into four higher-order categories of

- A) Direction of Attention
- B) Communicative Effort, or Force of Utterance
- C) Quality of Affect
- D) Activity Level.

These categories were selected for analysis on the basis of

- a) existing descriptive accounts of the main features of infant communicative behaviour (Stern, 1971, 1974a, b; Fogel, 1977; Trevarthen, 1977, 1979) and
- b) the literature quoted above on the effects of perturbations on infants; these effects being predicted to be differentially distributed across the experimental conditions.

The categories were constituted as shown below, the numbers referring to a classification of behaviours used during scoring, in which different

parts of the infant's body are grouped together.

A) Direction of Attention

(i) Act showing the infant's attention to the mother's face.

1) gaze to mother

(ii) Acts where the baby withdraws his attention from the mother and becomes either self-absorbed or avoidant, thus:

3) looks away and down

4) looks at own hand or body part

B) Communicative Effort or Force of Utterance

This was indicated by mouth postures ranging from 'active' through more 'neutral' to 'lack of communicative effort':

24) tonguing - the tongue being either protruded between open lips, or being pushed into the lower or upper lips

25) a wide open shaped mouth posture

26) mouth a little open and relaxed

26a) mouth closed

C) Affect

(i) Indications of positive affect

14a) L palm held open

23a) R palm held open

34) eyebrows raised

35b) eyebrows relaxed

36) smiling

37) head held up

(ii) Indications of distress or displacement activities

(a) Distress

14) L fist clenched

23) R fist clenched

32) crying

35) eyebrows frowning

35a) eyebrows in a raised frown

9) L arm thrashing, held outstretched and tense

18) R arm thrashing, held outstretched and tense

36a) a neutral expression

37) head drooped down

(b) Displacement

- 10) L hand fingering clothes
- 19) R hand fingering clothes
- 11) L hand touching face
- 20) R hand touching face
- 28) grimacing of mouth
- 29) bite lower lip - the upperlip is pulled down to cover the lower lip
- 30) pout - the mouth is closed with both lips pushed forward and out
- 27) chewing - the jaw is moved up and down with the mouth closed, lips pulled tight shut
- 31) yawning
- 33) suck thumb

D) Level of Activity - ranging from high to low

- 7) L arm held above or at shoulder level
- 16) R arm held above or at shoulder level
- 8a) L hand held out beyond body
- 17a) R hand held out beyond body
- 6) L arm held below shoulder level
- 15) R arm held below shoulder level
- 7a) L hand held down at side
- 16a) R hand held down at side
- 8) L hand held in front of body
- 17) R hand held in front of body

A half second time interval was decided upon since any longer would have obscured very brief acts such as quick glances made to the mother's face, movements of the arm from one position to another, or eyebrow flashes. At the same time, this interval did not appear to be too large since the above behaviours all lasted approximately half a second. If a behaviour such as a glance to the mother lasting 12 frames ($\frac{1}{2}$ second) was distributed across two time blocks unevenly, e.g. in the ratio 8:4 or 2:10 frames the time block which had the larger proportion was scored as containing that behaviour, and the other was left unscored; if the distribution was even (6 : 6) then random figure tables were used to decide which block should be scored. This, in fact, was a rare

event and although this meant that the limit of accuracy was $\frac{1}{4}$ sec., the pay-off in analysis time was considered to justify it.

The analysis was done using a 16 mm Perceptoscope Analysing Projector which has a hand control permitting frame-by-frame viewing. After each $\frac{1}{2}$ second time block had been viewed, a sheet with the time blocks, against which were listed the above categories of behaviour, was scored according to the presence or absence of the latter. During this analysis, the view of the mother's face and the signalling white ball were blacked out so that knowledge of the condition would not influence scoring. Once this procedure had been completed the exact timing of each condition was recorded on the data sheet by reference to the mother's behaviour. The scoring could not be claimed to be completely blind however, since the order and approximate timing of conditions was known.

Interviewer reliability

It was decided, therefore, to estimate the degree of accuracy by having a sample of data analysed blind by an observer, who scored independently along dimensions which seemed particularly susceptible to possible misreading, i.e. the direction of gaze, the mouth postures and expressions, and eyebrow positions. It was not thought necessary to take an independent score for limb positions which involve no ambiguity.

An observer, (Penelope Hubley) with several years' experience in doing similar detailed film analysis of infant behaviour, scored the groups of behaviour mentioned above in $\frac{1}{2}$ second time blocks for one session. As in the original scoring the view of the mother was obscured, and the observer was unaware of the nature of the experimental conditions. The coincidence between the 2 sets of scores was as follows, collapsing separate acts into categories of gaze, mouth postures and expressions, and eyebrow positions:-

gaze -	93.64%
mouth postures and expressions -	72.64%
eyebrows -	87.34%

Conclusions

Preliminary analysis of these sessions revealed that the blank-face presentation had indeed been successful in eliciting clearly perturbed behaviour in the infants. This study was then replicated with more subjects. The results of the first and the more extensive study were pooled together, and are given below (p.85 cf). Furthermore, a refinement of perturbatory procedure was incorporated into this more extensive study, and was devised in order to be able to specify more clearly the respects in which perturbations can be disruptive, and particularly whether the disturbance could be of a purely interpersonal nature of a kind which would support a theory of intersubjective capacity.

EXPERIMENT II: THE EFFECTS ON THE INFANT OF BLANK-FACE PRESENTATIONS AND NATURAL INTERRUPTIONS TO THE MOTHER, IN THE COURSE OF FACE-TO-FACE EXCHANGES

A situation was arranged which followed on from Tatam's work in particular (Tatam, 1974, see p. 45), since this had been specifically addressed to the problem of examining the effects on the infant of inappropriate and non-reciprocal behaviour of the partner.

The perturbation Tatam employed involved the mother's first talking to her baby normally, and then, while continuing to look at him, to begin talking to another adult. This meant that her behaviour became both altered in style and also unresponsive to the baby. The disruption was found to be disturbing to the nine-week-old infants, but the question

remains whether this effect was due

- (a) to the change in 'stimulus properties' or style of speech (i.e. from 'baby talk' to adult-adult speech, with many known different qualities - see Chapter 7) which was disruptive, and which would support the discrepancy hypothesis, or
- (b) to the mother's failure to respond reciprocally (consistent with both violation-of-reciprocity hypotheses described above), or finally to
- (c) to the non-reciprocal and changed quality of the mother's behaviour, while continuing to face the infant as if attending.

If the last ^{hypothesis} were proved correct, it would be evidence for extremely specific expectations on the infant's part about what constitutes acceptable and appropriate behaviour in his mother. Such evidence would be consistent with a theory of intersubjective capacity, and also partly compatible with the interpretation offered by Tronick et al (1975, 1978) that the mother's appearing full face to the infant whilst silent and still is distressing because it conveys contradictory messages to the infant - that of being in readiness for interaction, yet non reciprocating. This in itself would imply a high degree of awareness in the infant of the communicative qualities of other persons.

Design

To compare effects of the various perturbing factors, a situation was arranged, then, which involved the mother's switching to a speech style appropriate to addressing another adult after a period of interaction with her infant, as in Tatam's study. In this case, however, the experimental manipulation did not require the mother to continue looking at her baby's face as it did in Tatam's experiment. Instead, the mother was naturalistically interrupted in the course of talking to her baby by an adult entering the room, and chatting with her briefly, in view of the infant; the mother of course turning in her chair to talk to the intruder.

This procedure eliminated the mother's being apparently ready for interaction with the infant - looking ^{at} his eyes, but being unresponsive and changing her style of behaviour in an 'incomprehensible' way - i.e. the disruptive effects assumed to operate in a theory of intersubjectivity or an explanation in terms of the conveying of conflicting cues. It was hypothesized then, that if infants of the same age as those in Tatam's study failed to show the same distressed reaction [redacted] as was obtained in his experiment, this would argue for its being the combination of ^{apparent} readiness for interaction with the baby, and non-responsiveness and inappropriateness in her behaviour, which was the disturbing effect in his situation. It would eliminate the suggestion that the baby's distress was caused simply by a change to another style of behaviour or non-reciprocation per se, and thus ^{adduce} evidence for the extreme specificity of expectations in the infant for natural social behaviour of persons. It would show his ability ^{when} under three months of age, to distinguish between attentive and inattentive behaviour in his mother and to find it either acceptable or not according to whether or not she was looking at him [redacted] and thus apparently ready for interaction. Such an interpretation is suggested by the work of Wolff (1963), Robson (1967) and Papousek (1974) (on mirror image recognition) which demonstrates the sensitivity to, and importance of, eye-to-eye contact in infants at this age.

The combination of these two conditions ('Still-Face' and 'Interruption') was carried out in the same experimental sessions, after the initial study employing the former alone. Combining them allowed for a comparison of any distress brought about during the Interruption condition with the baby's reactions to the Blank-Face condition, thus allowing for the hypotheses in question to be properly tested.

In view of the distressed reactions obtained in the preliminary study, and the fact that in two of these sessions the infant could not

be encouraged to resume his previous style of interaction for a few minutes following the perturbation, it was decided that in this main study, where the Blank-Face condition was combined with the Interruption to the mother, the Interruption should invariably take place before the Blank-Face condition in case distress in reaction to the latter, becoming self-perpetuating (Stechler and Carpenter, 1967), jeopardised this part of the investigation. The desirability of taking this precaution is borne out by the finding of Carpenter et al (1970) that there was a carry over effect on reactions to other stimuli if the mother was presented blank face first, in terms of first fixation times, in infants from 2 to 8 weeks old. Sroufe, and also Emde et al (1976) have also noted sequence effects with fearful behaviour in older infants. Against the possible argument that increase in fatigue might tend to sway results in the direction of the hypothesis, it should be noted that Sroufe et al found that as familiarization time increased, so the tendency to show negative affect at perturbations such as stranger approach decreased. This effect then would work against the hypothesis that the interruption condition would evoke less distress, and so tend to counterbalance any fatigue effects.

This second study was conducted over six weeks, approximately once weekly for each of three subjects. The age range chosen was from six to twelve weeks, a period described as one of 'primary intersubjectivity' by Trevarthen (Trevarthen, 1979). The term reflects the tendency for this to be a period of intense interest on the baby's part in face-to-face encounters with a sympathetic partner. The beginning of this period marks the time when mothers say that they feel that now their baby really is a person, really human, and this seems to be partially attributable to the infant's making more reliable eye-eye contact and smiling regularly at them (see Ambrose, 1961; Wolff, 1963; Robson, 1967; Emde et al, 1976; Hutt and Ounsted, 1966). Prior to this, infants

are generally reported to be far less sensitive to external conditions and they have been described as ^{being an} autistic state (Mahler), or having a stimulus barrier suggested to result from immaturity of the C.N.S. (Spitz). Although, as Oster, (1978) Meltzoff and Moore (1977) and Carpenter show, extreme specificity in reactions to the environment can be obtained in the first three weeks, these reactions are not reliable and they are dependent on specific behavioural states until around the end of the first month. By twelve weeks, the infant's sole attention to his mother in a face-to-face interaction is ^{again} not so secure; and some infants, at least, appear to avoid such contact with their mother in combination with an increased awareness of, and interest in, the wider physical world (Trevvarthen, 1974; Sylvester Bradley and Trevvarthen, 1978) and in other people (Emde et al, 1976).

Subjects were three infants, two girls and one boy, who were seen on average five times each between six and twelve weeks of age at approximately one week intervals. The same conditions of recruitment applied as for Experiment I.

Apparatus - as for experiment I, but with an extra fifty feet of cine film being used.

Instructions to the mother - as for experiment I.

Procedure - as before but with two experimental conditions preceding those described in experiment I.

Condition I

The mother chatted to her infant normally for two to three minutes. The last $\frac{1}{2}$ minute of this period was filmed, once the infant was fully attending to the mother.

Condition II

With the baby attending to the mother, the experimenter went into the recording room in view of the infant and spoke to the mother, asking

her some casual question about the baby. The experimenter was the same person for all sessions and she tried to keep her behaviour constant. After approximately 20 seconds the experimenter left the room. The length of this condition varied across sessions by a few seconds as it was attempted to keep its course as natural as possible, but every attempt was made to keep the time constant where consistent with the mother's sense of ease and the naturalness of the conversation.

Condition III

Here the mother resumed contact with her baby and the session then proceeded in the same way as in the first study.

Altogether, thirteen complete sessions were obtained, Table 4, I: one session was filmed for only the first three conditions since the baby was violently sick at the end of these. In one session, unfortunately, only conditions III, IV and V were obtained on film due to a mechanical fault in the camera; this was corrected for the IIIrd condition.

Categories of analysis and scoring

These were the same as for Experiment I with an additional category in the section for the baby's direction of gaze, relevant to Condition II only, i.e. 'gaze to experimenter'.

Results

The data from the two experiments were pooled for analysis since the last three conditions of Experiment II were identical to the conditions of Experiment I. The final conditions thus available for analysis, along with the subjects' ages are shown in Table 4.I.

TABLE 4.1

Conditions available for analysis from Experiments I and II
showing subjects + ages

Subject	Age in Weeks	Conditions					
		Normal	Interruption	Normal	Still-face	Normal	
<u>Exp. I</u>							
1	EA	5½			X	X	X
2	MM	6			X	X	X
3	NK	6			X	X	X
4	MB	6			X	X	X
5	MM	7			X	X	X
<u>Exp. II</u>							
6	MK	7	X	X	X	X	X
7		9	X	X	X	X	X
8		10	X	X	X	X	X
9		11	X	X	X	X	X
10	EG	7	X	X	X	-	-
11		9	X	X	X	X	X
12		10	-	-	X	X	X
13		11	X	X	X	X	X
14	CC	12	X	X	X	X	X
15		6	X	X	X	X	X
16		8	X	X	X	X	X
17		9	X	X	X	X	X
18		10	X	X	X	X	X
19		11	X	X	X	X	X
20		12	X	X	X	X	X

Detailed Predictions for the Distribution of the Various Acts

a) Across the 'Blank-Face' and 'Normal' Interaction Conditions

A) Direction of Attention

All the theories of perturbed behaviour in infants of this age range which have been considered (pp. 48-55, Chapter 2), and which assume the infant to be sensitive to changes in the mother's acts and to regulate their behaviour in accordance with them, would predict a withdrawal of gaze and attention to occur during the mother's blank-faced unresponsive period, compared to normal interactions. Very general recognition has been given to the sensitivity of the infant's direction of gaze in work of diverse interests, and it has been particularly noted to be influenced by perturbations (see pp. 44-46). In fact, it has been claimed that visual orienting is the system first under the baby's control, by which he is able to regulate his experiences with the world, and its withdrawal from the source of perturbation has been seen as the prototype of later defence systems for coping with situations which are found too difficult (Stern, 1971; Carpenter, 1975; Spitz, 1962; Brazelton et al, 1975). Furthermore, in adult conversations at least gaze is seen as playing a key role in the joint regulation of the ongoing process of communication (Kendon, 1967; Argyle, 1972; Duncan, 1972). On the basis of these considerations we should predict, therefore, the variations indicated in Table 4.IIA in the distribution of gaze and attention to obtain in the Blank Faced as compared with Normal interaction conditions.

B) Communicative Effort or Force of Utterance

Although not a great deal of explicit attention has been given in the literature to the mouth and tongue postures classified here as indicative of some communicative effort, in several accounts, behaviours have been noted to occur which would seem to correspond with the above categories. Aronson and Rosenbloom (1971) note as the most distinguishing characteristic of their condition where the mother's voice was displaced from the

TABLE 4.II

PREDICTED OUTCOMES FOR THE DIFFERENTIAL DISTRIBUTION OF ACTS
ACROSS 'NORMAL' AND 'BLANK-FACE' CONDITIONS

<u>Act. No.</u>	<u>Act</u>	<u>Normal</u>	<u>Blank Face</u>
<u>A. Attention</u>			
1	to mother	+	-
3	away from mother	-	+
4	own hand/body	-	+
<u>B. Communicative Effort</u>			
24	Tonguing	=	=
25	wide-open-shaped mouth	=	=
26	mouth relaxed	+	-
26a	mouth closed	-	+
<u>C. Affect</u>			
<u>Positive</u>			
14a	L palm open	+	-
23a	R palm open	+	-
34	Eyebrows raised	+	-
35b	Eyebrows relaxed	+	-
36	Smile	+	-
37	Head up	+	-
<u>Negative</u>			
9	(i) <u>distress</u> - L arm thrash	-	+
18	R arm thrash	-	+++
32	Crying	-	+
35	Frown	-	+
35a	Raised Frown	-	+
10	(ii) <u>displacement</u> - L hand touch clothes	-	+
19	R hand touch clothes	-	+
11	L hand touch face	-	+
20	R hand touch face	-	+
28	Grimace	-	+
30	Point	-	+
27	Chew	-	+
29	Bite lower lip	-	+
31	Yawn	-	+
33	Suck thumb	-	+
<u>D. Activity</u>			
6	L arm below shoulder	=	=
15	R arm below shoulder	=	=
7	L arm above shoulder	=	=
16	R arm above shoulder	=	=
7a	L arm at side	=	=
16a	R arm at side	=	=
8a	L arm beyond body	=	=
17a	R arm beyond body	=	=

image of her (see p. 43) the infant's vigorous tonguing movements, and several accounts have drawn attention to protest behaviours, including vocalizations combined with particular facial expressions, to occur in perturbing conditions or extinction phases (e.g. Rheingold et al, 1959; Koch, 1967). These observations, and the descriptions given of normal mother-infant interactions, (e.g. Brazelton et al, 1974; Tronick et al, 1975, Trevarthen, 1979) lead one to predict that both Normal and Blank-Face conditions will evoke communicative behaviours, of whatever emotional quality, including 'tonguing' and wide-open mouth movements, in infants of this age. On the other hand, the two acts in this category which would seem to be more intrinsically affectively toned - i.e. the distinction between the mouth being closed, or a little open and relaxed - the former having, it is suggested, a more withdrawn quality than the latter, might be supposed to be differentially distributed, the closed mouth posture obtaining to a greater extent in the Blank-Face condition than in the Normal interaction, and vice versa. We predict, therefore, the results shown in Table 4.IIB, to obtain across the two conditions for Communicative Effort.

C) Affect

All the theories considered, pp. 48-55 would predict that there would be more positive affect or happy expressions in the Normal conditions than in the Blank-Face condition and, conversely, more distressed and displacement activities would occur in the latter. The Positive Affect category includes behaviours which seem self-evidently to be indications of a happy state - 'smiling', 'relaxed brows', and others noted in the literature as evidence of keen interest - 'raised brows', 'upright posture' (Brazelton et al, 1975) or to distinguish relaxed from distressed moods - e.g. palms open vs. fists clenched (Papousek, 1967).

In the Negative Affect category are acts again which seem intuitively

to indicate unhappiness or puzzlement - crying, frowning, raised frowns, etc., or acts which are the converse of behaviours in the positive group - e.g. a neutral expression as opposed to a smile, other signs of distress noted in the literature - e.g. thrashing of the arms (Koch, 1967; Carpenter, 1975; Brackbill, 1958; Papousek, 1967) and a group of behaviours which we may term displacement activities. These last are often found to occur in situations of conflict, e.g. yawns, chewing and other grimaces (Tinbergen, 1952; Andrew, 1972), and to be features of the autistic profile - self-stimulatory acts like touching the clothes and face or sucking the thumb. The predicted outcome for the distribution of these acts across the two conditions is shown in Table 4.IIC

Level of Activity

Limb postures have received relatively little attention with respect to their relationship to emotional states (Lewis, 1978). Active movement of the limbs has been described as a feature of the normal communicative behaviour of infants (Brazelton, 1974; Trevarthen, 1979), and also as a feature of protest behaviour during perturbations (Papousek, 1967; Koch, 1967). Since no more specific details were available on distinguishing characteristics, no significant differences were predicted to occur for limb positions between the two conditions - see Table 4.IID.

Predictions about the differential distribution of acts between 'Interruption' and 'Normal' conditions

According to the discrepancy hypothesis of affect and attention, and the contingency hypothesis (outlined pp. 48, 52 Chapter 2), the Interruption condition should, as we have noted above, constitute a very similar situation for infants of this age to the Blank-Face condition, since the mother's behaviour in both cases becomes unrelated to the infant's (contingency hypothesis) and also deviates along several parameters from the standard of the mother which has either become, or is in the process

of becoming established (discrepancy hypothesis). On the basis of these theories, (then) it is argued that the Interruption condition should provoke the same behaviours in the infant as the Blank-Face condition in comparison with Normal interactions. This yields then the same predicted outcomes as for the Blank-Face condition shown in Table 4.II.

On the other hand, those theories (pp. 51, 54, Chapter 2) which interpreted the infants' reactions to the Blank-Face condition and to Tatam's perturbation in terms of an induced motivational conflict, with the mother's behaviour communicating two contradictory messages, or in terms of a disruption to the process of interpersonal relations, would generate some very different predictions from the above. In general one would expect that if the infant is able to perceive the communicative intentions in, and affective quality of, the acts^{of others}, then the mother's turning to talk to another person who briefly addressed her should not appear to be a distressing or threatening event as would the Blank-Face presentation. Some changes might indeed be expected to occur compared to the infant's behaviour in normal interactions - for example one would not expect the more active and very positive affective communicative behaviours, which are part of the shared interaction with the mother, to be generated; but neither would one expect the infant's behaviour to deteriorate into the distressed and avoidant state observed in the Blank-Face condition and in Tatam's experiment.

Specific predictions from these two theories are as follows:

A. Attention

One would expect that in the Interruption condition the mother's face would receive less attention than in the Normal condition - as for the discrepancy and non-contingency hypotheses, but here on the grounds that (a) the experimenter's entrance and talking would attract the infant's attention and compete with that to the mother, and (b) the

mother's not being involved in an interaction with the infant would mean that his attention would not be held by her to the same extent. On the other hand, one would not expect the same increase in avoidant or self-absorbed reactions predicted by the discrepancy and non-contingency hypotheses, since the predicted relative lack of attention to the mother in the Interruption condition is not assumed here to be negatively toned as it is in the other theories. The predicted outcomes then for this category are shown in Table 4.IIIA.

B. Communicative Effort/Force of Utterance

We have seen how under the discrepancy and non-contingency hypotheses tonguing and wide open shaped postures would be expected to occur with equal frequency in both the Blank-Face and Normal conditions, since it is thought that they can be motivated both as protests or as signs of positive and excited affective involvement; and therefore they should also be expected to be provoked (as protests) in the Interruption condition. However, according to the conflict and intersubjectivity theories, one should expect a reduction in these behaviours to obtain in the Interruption condition (a) because it is supposed ^{that} no protests should be provoked and (b) because active expressions of communication would neither be generated and supported by the mother's involvement, nor indeed ^{be} appropriate, given her attention to the experimenter. Since no such communicative effort is expected to be produced, and some slight decrease in attention to the mother is, one might therefore expect the infant's mouth to be in a closed posture more often in the interruption condition than in the normal condition, but to be in a relaxed posture with equal frequency in both. Table 4.IIIB.

C. Affect

Both theoretical positions put forward here would predict, as for the discrepancy and noncontingency hypotheses, a reduction in active

TABLE 4.III

Table of predicted outcomes of differences between Normal and Interruption conditions generated by Conflict and Intersubjectivity Hypotheses

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Interruption</u>
<u>A. Attention</u>			
1	to mother	+	-
3	away from mother*	=	=
4	own hand/body*	=	=
<u>B. Communicative Effort</u>			
24	Tonguing *	+	-
25	Wide-open-shaped mouth*	+	-
26	Mouth relaxed*	=	=
26a	Mouth closed	-	+
<u>C. Affect</u>			
<u>Positive</u>			
14a	L palm open	+	-
23a	R palm open	+	-
34	Eyebrows raised	+	-
35b	Eyebrows relaxed*	=	=
36	Smile	+	-
37	Head up*	=	=
<u>Negative</u>			
9	(i) distress: L arm thrash*	=	=
18	R arm thrash *	=	=
32	Crying *	=	=
35	Frown *	=	=
35a	Raised Frown *	=	=
<u>(ii) displacement:</u>			
10	* L hand touch clothes	=	=
19	* R hand touch clothes	=	=
11	* L hand touch face	=	=
20	* R hand touch face	=	=
28	* Grimace	=	=
30	* Pout	=	=
7	* Chew	=	=
29	* Bite lower lip	=	=
31	* Yawn	=	=
33	* Suck thumb	=	=
<u>D. Activity</u>			
6	L arm below shoulder	=	=
15	R arm below shoulder	=	=
7	L arm above shoulder*	+	-
16	R arm above shoulder*	+	-
7a	L arm at side*	-	+
16a	R arm at side*	-	+
8a	L arm beyond body	=	=
17a	R arm beyond body	=	=

expressions of positive affect (i.e. all acts in the positive affect category except relaxed brow and head held up) to occur in the Interruption condition for the same reasons given above; that one should expect a reduction in active expressions of communicative effort. However, the conflict and intersubjectivity theories would predict, unlike the discrepancy and non contingency hypotheses, that there would be no significant increase in the Interruption condition of distressed or displacement activities, as would occur in the Blank-Face conditions. Table 4.IIIC.

D. Activity

Just as for the Blank-Face versus Normal conditions, no differences in activity type are predicted between Interruption and Normal conditions under the discrepancy and non contingency hypotheses since vigorous movements of limbs could either be motivated as protests or as excited, pleasurable acts. Predictions^{derived} from the intersubjectivity and conflict theories are less clear^{since} no evidence could be found recording the infant's limb activity in conditions where there were neither active interest and direct involvement in some task or person, nor distressed reactions.

However, it might be supposed that where neither of these two states occur, a quietening of limb activity would obtain, and therefore perhaps fewer limb postures at or above shoulder level, and more postures where the hands rest at the side of the body. This suggestion is however very tentative, see Table 4.IIID.

Critical predictions, i.e. those where the two sets of theories are at variance, are asterisked, in Table 4, II

RESULTS

Results of comparisons of the distributions of all acts across the various conditions

Blank-Face and prior Normal interaction conditions.

The proportion of the total number of time units in each condition

occupied by each act was calculated (by subject and by session):

e.g. for subject X, session Y, calculate:

$$X = \frac{\text{No. of units occupied by act 1 in condition 2}}{\text{Total number of time units in condition 2}}$$

expressed as a percentage.

Having established that the necessary approximations to a normal distribution and homogeneity of variance in all of a random sample of five acts obtained, t tests for correlated samples (or matched pairs) were performed on each act's distribution as a proportion of condition length across the two conditions Normal interaction (condition III) and subsequent Blank-Face presentation (condition IV), by subject and by session. In the case of pairs of acts that were mutually exclusive, e.g. arm either in front of or beyond body, only one of the pair was submitted to the test.

The outcome of these tests, given as one-tail significance levels for cases where directional predictions were made, and two-tail where no direction was expected, is shown in Table 4.IV.

The same procedure was then carried out on data for the Normal interaction (condition I) and the Interruption (condition II); the results of t tests carried out on this data are shown in Table 4.V.

Since it is not legitimate to use the t test on the same sample of data twice, no statistical comparison was possible between the final Normal interaction and the other conditions. The results for this, and all following experiments, were therefore subjectively assessed for the infants' recovery upon resumption of communication by the mother following the perturbatory procedures. In this, and ⁱⁿ all the following experiments, and in all the sessions except the two mentioned previously in the pilot study (p. 66), the infant resumed his previous style of behaviour towards the mother within a few seconds of their interaction being re-established.

Results on the distribution of acts across conditions in terms of overall frequency of occurrence

Blank-Face vs. Normal

Results of t-tests comparing the distribution of acts under Blank Face and Normal conditions (Table 4.IV) confirm the predictions outlined above for 25 of 36 acts, with 19 acts differing significantly in their distribution across the two conditions in the predicted direction. Generally then, one finds, as expected, that attention to and interest in the mother drops in the Blank Face condition. There are fewer expressions of positive affect and more distressed and displacement activities, and active communicative effort is equally distributed, as is activity level. Facial expression, eyebrow, mouth postures and direction of gaze are almost invariably systematically sensitive and conform to expectations. However, limb, hand and body postures, at least according to this method of analysis, are far less discriminating; eight out of the eleven predictions which were not confirmed consisted of such acts; and this may reflect their serving different motivational states.

The general picture we have, then, of the baby's behaviour during the Normal interactive sequences confirms other descriptions, e.g. Trevarthen (1979) Brazelton et al (1974). The baby looks at his mother's face most of the time (mean $X = 88.8\%$), making active arm gestures and movements of the mouth and tongue. His expression is generally relaxed, but interested and happy with frequent smiles (mean $X = 31.8\%$). However, when his mother suddenly becomes silent and unresponsive, he averts his gaze from her face and looks down; he almost never smiles (mean $X = 4.2\%$); and his relaxed expression drops (from mean $X = 45.2\%$ to mean $X = 27.4\%$); manifold signs of distress are shown in peculiar grimaces of the mouth, in increased handling of his clothes, touching his face and sucking thumb or fingers, crying and

TABLE 4.IV

Obtained outcomes of differential distribution of acts across
'Normal' vs. 'Blank-Face' Conditions

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Blank-Face</u>	<u>Sig. Level</u> (<u>t tests</u>)
A. <u>Attention</u>				
1	to mother	+	-	.0005 lt.
3	away from mother	-	+	.0005 lt.
4	own hand/body	=	=	NS
B. <u>Communicative Effort</u>				
24	Tonguing	=	=	NS
25	Wide-open-shaped mouth	=	=	NS
26	Mouth relaxed	+	-	.025 lt.
26a	Mouth closed	-	+	.071 lt.
C. <u>Affect</u>				
<u>Positive</u>				
14a	L palm open	=	=	NS
23a	R palm open	=	=	NS
34	Eyebrows raised	+	-	.0005 lt.
35b	Eyebrows relaxed	+	-	.0005 lt.
36	Smile	+	-	.0005 lt.
37	Head up	=	=	NS
<u>Negative</u>				
(i) distress:				
9	L arm thrash	=	=	NS
18	R arm thrash	=	=	NS
32	Crying	-	+	.1 lt.
35	Frown	-	+	.005 lt.
35a	Raised Frown	-	+	.05 lt.
(ii) displacement:				
10	L hand touch clothes	-	+	.05 lt.
19	R hand touch clothes	=	=	NS
11	L hand touch face	-	+	.1 lt.
20	R hand touch face	-	+	.1 lt.
28	Grimace	-	+	.005 lt.
30	Pout	-	+	.01 lt.
7	Chew	=	=	NS
29	Bite lower lip	-	+	.1 lt.
31	Yawn	-	+	.05 lt.
33	Suck thumb	=	=	NS
D. <u>Activity</u>				
6	L arm below shoulder	+	-	.1 2t
15	R arm below shoulder	=	=	NS
7	L arm above shoulder	-	+	.1 2t
16	R arm above shoulder	=	=	NS
7a	L arm at side	=	=	NS
16a	R arm at side	=	=	NS
8a	L arm beyond body	=	=	NS
17a	R arm beyond body	=	=	NS

lt = 1tailed test

frowning. Efforts at communication, defined by the degree of wide open shaped and tonguing postures of the mouth, do not cease; and since the whole sequence is toned with negative affect, and as activity level does not drop, it seems justifiable to think of these efforts as protests or solicitations for responsiveness.

Interruption vs. Normal

t-tests comparing the distribution of acts in the Interruption and Normal conditions show (Table 4.V) that for the critical comparisons, where the predictions differed according to the discrepancy and non-hypotheses on the one hand contingency, or else the intersubjectivity and conflict hypotheses on the other, the latter two are far better able to account for the data; 19 out of these predictions being confirmed, whereas only six outcomes are predicted by the former. Of the remaining nine, common to both kinds of theory, eight predictions are confirmed.

The general picture to emerge of the differences in the baby's behaviour between these two conditions is that while the mother is interrupted, the baby's attention to her drops (from mean $X = 90.2\%$ to mean $X = 76.9\%$) - not because he becomes avoidant and withdrawn (no significant differences are found between the two conditions in the amount of looking down and away from the mother), but because his attention is caught by the experimenter's entrance (regard to E is mean $X = 14.7\%$, which accounts for the differences between mean amounts of looking to the mother's face in the two conditions). The active mouth and tonguing movements found in the Normal condition, taken to indicate the degree of communicative effort, drop: the infant, quite appropriately, seems not to try to communicate with his mother while she is engaged in conversation with the experimenter. Likewise, the very active signs of positive affect which characterise Normal interactions - smiling, raising brows, are no longer maintained to the same extent by the infant's

TABLE 4.V

Obtained outcomes of differential distribution of acts across
Normal vs. Interruption Conditions

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Interruption</u>	<u>Sig. Level</u> (t tests)
A. <u>Attention</u>				
1	to mother	+	-	.05 lt
3	away from mother	=	=	NS
4	own hand/body	=	=	NS
B. <u>Communicative Effort</u>				
24	Tonguing	+	-	.01 lt.
25	Wide-open-shaped mouth	+	-	.005 lt.
26	Mouth relaxed	=	=	NS
26a	Mouth closed	-	+	.005 lt.
C. <u>Affect</u>				
<u>Positive</u>				
14a	L palm open	+	-	.01 lt.
23a	R palm open	=	=	NS
34	Eyebrows raised	+	-	.1 lt.
35b	Eyebrows relaxed	=	=	NS
36	Smile	+	-	.0005 lt.
37	Head up	=	=	NS
<u>Negative</u>				
9	(i) distress: L arm thrash	=	=	NS
18	R arm thrash	=	=	NS
32	Crying			NE
35	Frown	=	=	NS
35a	Raised Frown	+	+	.025 lt.
(ii) displacement:				
10	L hand touch clothes	=	=	NS
19	R hand touch clothes	=	=	NS
11	L hand touch face	=	=	NS
20	R hand touch face	=	=	NS
28	Grimace	+	+	.1 lt.
30	Pout	=	=	NS
7	Chew	=	=	NS
29	Bite lower lip	=	=	NS
31	Yawn			NE
33	Suck thumb	=	=	NS
D. <u>Activity</u>				
6	L arm below shoulder	+	=	NS
15	R arm below shoulder	+	=	NS
7	L arm above shoulder	+	=	NS
16	R arm above shoulder	+	=	NS
7a	L arm at side	+	=	NS
16a	R arm at side	+	=	NS
8a	L arm beyond body	+	=	NS
17a	R arm beyond body	+	=	NS

Results which confirm the Discrepancy and Non-Contingency hypotheses are indicated '+', those confirming conflict and Intersubjectivity theories by '≠'.

l.t. = 1 tailed test

involvement in communicating with his mother (smiles drop from mean 31.8% to $X = 3.3\%$, and raised brows from 32.8% to $X = 23.9\%$). Nevertheless, the mother's being interrupted does not constitute a distressing event; for even though these signs of excited, happy behaviour drop, those displacement activities and other indications of distress which were found to increase markedly in the blank face condition do not do so here, apart from a slight trend for an increase in one of the grimacing postures (from mean $X = \text{zero}$ to mean $X = 0.3\%$).

It is interesting to note that those critical comparisons tending to confirm the intersubjectivity and conflict theories for the 'Interruption vs. Normal conditions, fall into the same broad categories of direction of attention, quality of affect and force of utterance which were found best to distinguish the Blank-Face and Normal conditions. Those acts (limb postures) which failed to distinguish between the latter, and which according to the intersubjectivity and conflict theories ^{in such situations} should be differentially distributed, are again found not to be so, and in fact constitute four out of the six critical cases supportive of the non-contingency and discrepancy hypotheses.

On the other hand, several acts involving limb activity which had not confirmed the predictions in the Normal vs. Blank-Face comparison (Table 4, ^{considered} II), were again equally distributed between the two conditions here, and in so being were taken as confirmation of the conflict and intersubjectivity theories. However, since they had previously been shown not to be sensitive to condition, their failure to discriminate here should perhaps not be taken as very strong evidence in favour of the intersubjectivity and conflict theories, which it first appears to support, but again as reflecting their relative inadequacy to distinguish such situations. The significance of this issue remains unclear.

Nevertheless, as outlined above, the results for the expression of

communicative effort, quality of affect and the direction of attention strongly confirm the hypotheses ^{derived from the} Conflict and Intersubjectivity theories.

A summary of acts which best distinguish the different conditions is shown below (Table 4.VI).

TABLE 4.VI

Most distinguishing infant acts grouped according to pattern of change		Changes in the mother's behaviour			
		Normal-Interruption		Normal-Blank	
A	Gaze to mother	+	.05		
	Eyebrows raised	+	.1	1 tail -	+ .0005 -
	Eyebrows relaxed		NS		+ .0005 -
	Mouth a little open and relaxed		NS		+ .025 -
B	Smiling	+	.0005	-	+ .0005 -
C	Wide open shaped mouth	+	.0005	-	NS
	Tonguing movements	+	.01	-	NS
	Left palm open	+	.01	-	NS
D	Gaze away and down		NS		- .0005 +
	Grimacing		NS		- .005 +
	Pouting		NS		- .01 +
	Yawning		NS		- .05 +
	Frowning		NS		- .005 +

Behaviour Groups		Changes with treatment
A	Positive attention to mother interested or relaxed expression with mouth relaxed and open.	Significant drop with <u>Blank-Face</u> . No real change with <u>Interruption</u> .
B	Smiling	Significant drop with both <u>Blank-Face</u> and <u>Interruption</u> .
C	Strong Communicative Effort, of pleasure or distress, tonguing and left palmed gestures.	Significant drop with <u>Interruption</u> . No change with <u>Blank-Face</u> .
D	Communicating distress	Significant increase with <u>Blank-Face</u> , but not with <u>Interruption</u> .

The organization of acts

We have seen above how the different acts are distributed in their overall frequency of occurrence across the different sets of conditions. However, not only are we interested in overall frequencies, but also in

how these acts are organized: for example, do the different behaviours and expressions where the frequency falls in the Blank-Face condition simply occur continuously and then drop out altogether, or do they become differently organized, occurring for example in short bursts rather than in continuous streams.

To examine whether such qualitative differences exist across the various conditions, the average duration of bursts of behaviours (a burst being defined as the occurrence of an act separated by its non-occurrence for at least $\frac{1}{2}$ sec.) was calculated for each act across each condition, taking the results together for all subjects and sessions as was done for the overall frequencies. t-tests were performed on the average durations; no directional predictions were made; and therefore 2 tail levels of significance were used.

Average durations of acts across Normal and Blank-Face conditions

These results are shown in Table 4.VII. Several acts (13) do indeed change qualitatively, their average duration significantly altering across these two conditions. These are, by and large, those same acts where the overall frequency alters, with the change in average duration following the same directional pattern as overall frequency - a drop in frequency in one condition being accompanied by a fall in the duration of average act length in the same condition. In two cases, however, (tonguing, and left arm held out beyond the body, which both have longer average durations in the Normal condition) the average duration alters where there is no such overall change. But, conversely, nine acts which are differentially distributed in terms of their overall frequencies show no significant change in their average duration, indicating that the drop in frequency across conditions is due to there being a more complete cessation of that act at some point, rather than a reorganization of its form.

TABLE 4.VII

The differential distribution of Average Act Lengths between
Normal and Blank-Face conditions

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Blank-Face</u>	<u>Sig. Level</u> (t tests)
A. <u>Attention</u>				
1	to mother	+	-	.001
3	away from mother	-	+	.1
4	own hand/body	=	=	NS
B. <u>Communicative Effort</u>				
24	Tonguing	+	-	.05
25	Wide-open-shaped mouth	=	=	NS
26	Mouth relaxed	+	-	.1
26a	Mouth closed	#	#	NS
C. <u>Affect</u>				
<u>Positive</u>				
14a	L palm open	=	=	NS
23a	R palm open	=	=	NS
34	Eyebrows raised	+	-	.02
35b	Eyebrows relaxed	+	-	.01
36	Smile	+	-	.01
37	Head up	=	=	NS
<u>Negative</u>				
9	(i) distress: L arm thrash	=	=	NS
18	R arm thrash	=	=	NS
32	Crying	=	=	NS
35	Frown	=	+	.02
35a	Raised Frown	=	=	NS
(ii) displacement:				
10	L hand touch clothes	=	=	NS
19	R hand touch clothes	#	#	NS
11	L hand touch face	=	=	NS
20	R hand touch face	-	+	.1
28	Grimace	-	+	.001
30	Pout	-	+	.1
7	Chew	=	=	NS
9	Bite lower lip	=	=	NS
31	Yawn	-	+	.1
33	Suck thumb	=	=	NS
D. <u>Activity</u>				
6	L arm below shoulder	=	=	NS
15	R arm below shoulder	=	=	NS
7	L arm above shoulder	=	=	NS
16	R arm above shoulder	=	=	NS
7a	L arm at side	=	=	NS
16a	R arm at side	=	=	NS
8a	L arm beyond body	+	-	.05
17a	R arm beyond body	=	=	NS

1.t. = 1 tailed test.

We find, then, as with the overall frequencies, that it is generally the arm and body postures, and in this case the activity of the hands too, which do not change across the two conditions in terms of the length of act bouts. On the other hand, several of the expressions of attention to the mother, and of positive affect, which tend to occur significantly more ^{often} in the Normal condition overall, also tend to be more prolonged, ^{as regards} the duration of bursts, in the Normal condition. Avoidance and expressions of distress, or displacement activities, which predominate in the Blank-Face condition tend, when they do occur, to be more fleeting in their durations in the Normal interactions. See Table 4.VIII for a precis of these patterns of change.

TABLE 4.VIII

Most distinguishing patterns of change in average durations of acts across Blank-Face and Normal conditions

Acts of shorter duration in Blank-Face condition

A	Attention to mother	Gaze to mother's face
B	Communicative Effort	Tonguing
C	Affect: positive	Eyebrows raised Eyebrows relaxed Smiling
D	Activity	L arm beyond body

Acts of shorter duration in Normal condition

C	Affect: negative; distress displacement	Frowning Grimacing
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Normal vs. Interruption condition - a comparison of average act durations

Table 4.IX shows the outcomes of t-tests comparing the average duration of each act across Interruption and Normal conditions. Here one finds fewer (7) significant differences than were obtained between the Blank Face and Normal conditions, and the pattern of differences which are found further confirms the appropriateness and organization of the infant's acts in relation to the different interpersonal

situations: long, continuous gazes to the mother found in the normal interaction are replaced by gazes of shorter duration on average. We may presume ^{this is} because the infant intersperses his looks to his mother with glances to the experimenter. Efforts at communication not only fall overall, as we saw above (Table 4.V), but when tonguing or wide-open-shaped mouth postures do occur they are more fleeting, as are smiles. On the other hand, relaxed and closed mouth postures become prolonged in the Interruption condition. There is no increase in the average duration of distressed or displacement activities in the Interruption condition, again supporting the view that discrepancy and non-contingency hypotheses are inadequate to account for the infant's behaviour in this situation. As for the overall frequency measures, arm activity does not seem to differentiate these conditions since no significant differences are found in the average durations of the various limb postures.

Gaze

We have already remarked on the general recognition that has been given to the phenomenon of gaze aversion during perturbations and disturbed interactions, (e.g. Brackbill, 1958; Carpenter, 1970; Brazelton et al, 1975, Stern, 1971); and the results presented here on the distribution of the overall amount of looking and on the average durations of looking bouts, to the mother, across the different conditions, are strongly consistent with other reports.

Apart from treating gaze in this way, it was also thought important to examine the duration of bouts under the different treatments in more detail to see whether further qualitative differences were occurring, and also whether other acts were systematically related to gaze direction. It was hoped to obtain evidence in this way about the degree to which the baby's behaviour may be coherently organized. Indeed, Stern (1974a) has pointed out the shortcomings of the common tendency to report only

TABLE 4.IX

Differential distribution of Average Act lengths across
Normal and Interruption conditions

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Interruption</u>	<u>Sig. Level</u> (t tests)
<u>A. Attention</u>				
1	to mother	+	-	.05
3	away from mother	=	=	NS
4	own hand/body	=	=	NS
<u>B. Communicative Effort</u>				
24	Tonguing	+	-	.1
25	Wide-open-shaped mouth	+	-	.1
26	Mouth relaxed	-	+	.1
26a	Mouth closed	-	+	.05
<u>C. Affect</u>				
<u>Positive</u>				
14a	L palm open	=	+	.1
23a	R palm open	=	=	NS
34	Eyebrows raised	=	=	NS
35b	Eyebrows relaxed	=	=	NS
36	Smile	+	-	.01
37	Head up	=	=	N.S.
<u>Negative</u>				
9	(i) distress: L arm thrash	=	=	NS
18	R arm thrash	=	=	NS
32	Crying	=	=	NS
35	Frown	=	=	NS
35a	Raised Frown	=	=	NS
(ii) displacement:				
10	L hand touch clothes	=	=	NS
19	R hand touch clothes	=	=	NS
11	L hand touch face	=	=	NS
20	R hand touch face	=	=	NS
28	Grimace	=	=	NS
30	Pout	=	=	NS
7	Chew	=	=	NS
9	Bite lower lip	=	=	NS
31	Yawn	=	=	NS
33	Suck thumb	=	=	NS
<u>D. Activity</u>				
6	L arm below shoulder	=	=	NS
15	R arm below shoulder	=	=	NS
7	L arm above shoulder	=	=	NS
16	R arm above shoulder	=	=	NS
7a	L arm at side	=	=	NS
16a	R arm at side	=	=	NS
8a	L arm beyond body	=	=	NS
17a	R arm beyond body	=	=	NS

single aspects of gaze in that such a procedure can obscure how the behaviour may be organized, and he stresses the value of taking several measures together.

Duration of gaze bouts

It was decided to look further at the duration of bouts of gaze as one of the more qualitative aspects. A gaze bout was defined as a period of gazing to the mother separated by periods (of whatever duration - even 1 time unit - $\frac{1}{2}$ sec.) of looking away.

There have been several anecdotal reports of very brief glances characterising the infant's looking to the mother when her behaviour is distorted in some way as compared with the more continuous looks which occur during normal interactions, or when the infant looks at some stimulus not found to be aversive (Brazelton et al, 1975; Carpenter, 1970, 1974; Stechler and Latz, 1966). With this in mind, the durations of all gaze bouts, for each baby in each session and according to condition, were recorded as belonging to one of the three following categories:

- 1) short looks or glances - those lasting for 5 units or less i.e. $2\frac{1}{2}$ seconds duration or under.
- 2) looks of intermediate length - those lasting 6-10 units, i.e. between $2\frac{1}{2}$ and 5 seconds.
- 3) long looks - those of more than 10 units - or over 5 seconds long.

The total number of looking bouts (of all durations) was calculated for each condition, summing scores for individual babies and sessions.

It was then calculated what proportion of the total number of bouts in each condition was constituted by each of the three bout length categories above.

The resulting proportions are shown in Figure 4.I.

Results

It can be seen, from the distributions of the three kinds of looks in

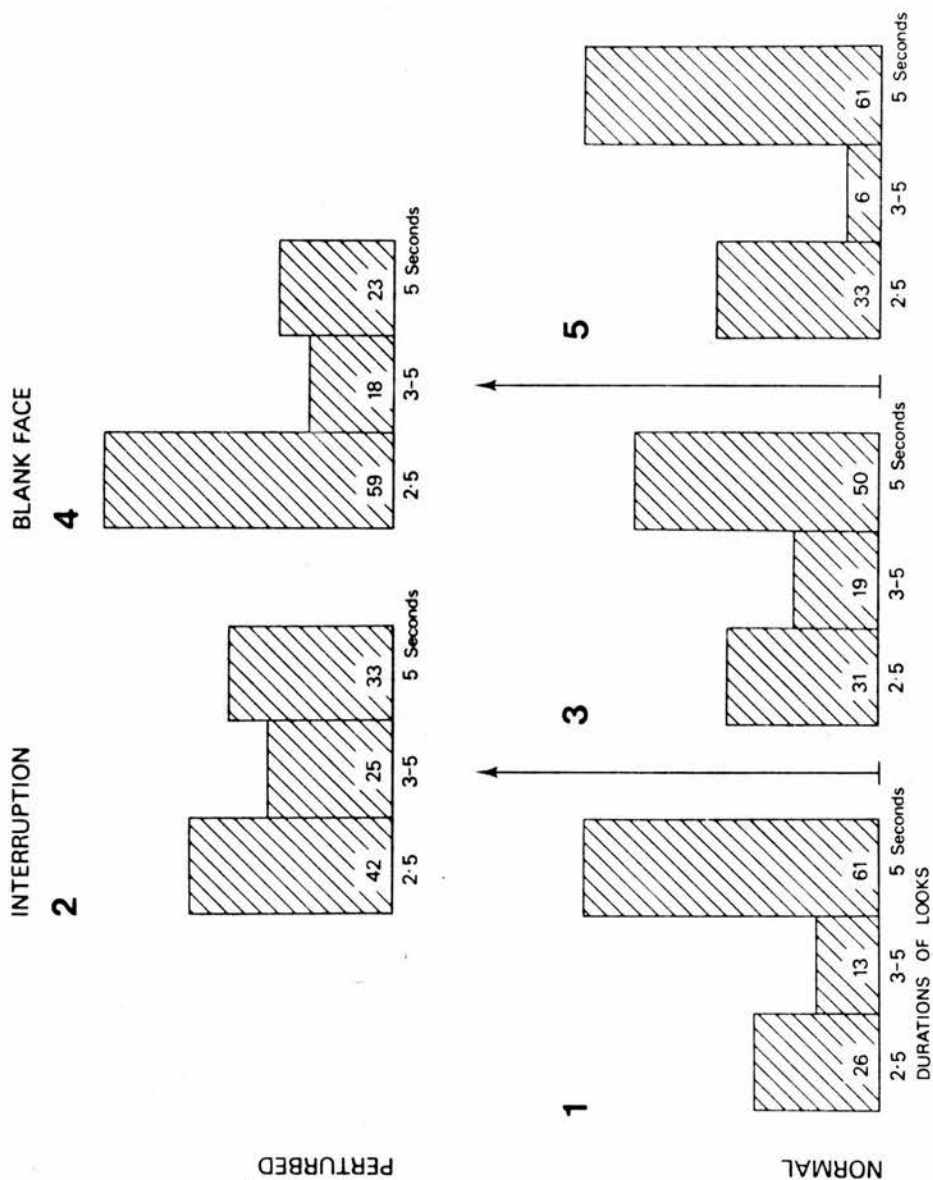


FIGURE 4 I

Frequency histograms, showing proportion of total number of looks in each condition constituted by looks of designated duration. Shorter looks become more common in perturbation, particularly in the Blank-face condition.

Figure 4.I, that during the conditions of Normal interaction most of the gaze bouts are of five seconds or longer (57.3% all gaze bouts). A smaller number are glances ^{of} under $2\frac{1}{2}$ seconds (30.1% all gaze bouts) and ^{very} few are of intermediate length, $2\frac{1}{2}$ to 5 seconds long (12.6%). This distribution markedly changes however in the Blank-Face condition. There is a dramatic rise in the number of short glances (to 59.1% total number of bouts) far fewer long, continuous looks (only 23.3% total looks) and a slight increase in looks of intermediate length. This pattern of change is to some extent brought about in the Interruption condition, but not so dramatically. These results confirm then the anecdotal evidence reported above, and reveal that it is not simply the overall amount of looking which changes across conditions, but that it is differentially organized, with a consistently higher proportion of long sustained, continuous looks in Normal conditions compared to the many short glances provoked in the Blank-Face condition. It was hoped that the significance of these different kinds of looks would become clearer on examining their co-occurrence with other acts.

Act Combinations

It has been shown above how several of the infants' acts, taken singly, vary in the distribution of occurrence according to the different treatments, both in their overall frequency and in the duration of their bursts; and the latter has been illustrated in particular with respect to gaze. It was, however, also felt important to get a more intuitively meaningful picture of the baby's behaviour across the various conditions; in particular to see how these different acts are related and combined with each other to produce a whole - more psychologically meaningful - profile than obtains when each act is considered in isolation.

With this in mind, the number of different ways which the 43 acts already considered combined with each other in the $\frac{1}{2}$ second time blocks was calculated. The potential number of these combinations is

approximately 10,000 and some 1,800 of these were actually obtained. Since even this number seemed too large to handle, a scheme was devised for collapsing the 48 acts into 4 main dimensions, each with its own scale of values. These were:

- 1) The Direction of Attention (0-3)
- 2) The Quality of Affect - from negative to positive (0 - 5)
- 3) The Degree of Limb Activity - from quiescent to very active (0 - 8)
- 4) The Degree of Communicative Effort (0 - 3)

The constitution of these four dimensions, derived from combining previously defined acts, is shown in Appendix No. I.

Once the originally obtained act combinations were re-categorized according to this system, 291 act combinations or profiles resulted from a possible 1,944. (Of these 110 constituted 87% of the infant's behaviour over all the sessions.) The four figure code is very simply translated into an act profile which captures critical aspects of the infant's state, mood, and direction of attention in one whole image, thus:

Combination number 18 (which occurs particularly in the Interruption condition - see below p. 103) reads 0330 which signifies that the baby is looking at the mother, shows neutral affect, some activity of the limbs and makes no communicative effort.

Combination number 38 (which occurs particularly in Normal conditions) reads 0542, signifying that the baby is looking at his mother, shows extremely positive affect, a moderate amount of limb activity and a moderate degree of communicative effort; whereas combination No. 39, which occurs very frequently in the Blank-Face condition is coded 2320.

It indicates that the baby is looking away from his mother, with neutral affect, very little activity and no effort at communication.

In order to see how these act profiles varied across the different conditions, the 20 most common combinations for each condition were taken,

summing scores for all subjects across sessions (42 combinations in all); and the proportion of each condition occupied in time by each of these combinations was calculated as a percentage of that and then both other condition lengths.

It is found from this treatment of the data that certain action profiles tend to predominate in one condition but to occur very infrequently in others, or else to occur rarely in one but to be equally distributed in the other two. The scores for these act profiles are set out in Table 4.X according to the pattern of frequency of occurrence, those predominating in the Normal conditions are shown in column I, those in the Interruption condition in column II, and those occurring most of all in the Blank-Face condition in column III. The codes for these conditions are set out adjacent to them.

Since all the babies had shown the same kinds of differences in their behaviour across the three conditions, it was felt justifiable to treat them as a homogeneous group and to pool the data from these combinations for all babies. The distribution that would obtain by chance across the different conditions was estimated for each of these most commonly occurring act combinations and the resulting expected frequencies were compared with the obtained outcomes, using the χ^2 test of 'goodness of fit'. Of the 42 act profiles, 31 showed a significantly different distribution across the three conditions from that predicted by chance, see Table 4.X, far right column of each condition for significance levels.

In one sense, these results merely replicate those for the distribution of individual acts, since act profiles, for example, which incorporate gaze avoidance are, due to the overall predominance of this act in the Blank-Face condition, likely to occur more frequently in this condition again. However, as noted already, the advantage of arranging the data into these act profiles is that they convey a more holistic impression

of the baby's state. Furthermore, this method permits the following examination of the interrelationship and temporal organization of the different aspects of the infant's behaviour at the micro level of $\frac{1}{2}$ second time blocks, and in this respect takes the analysis beyond that carried out on the acts individually.

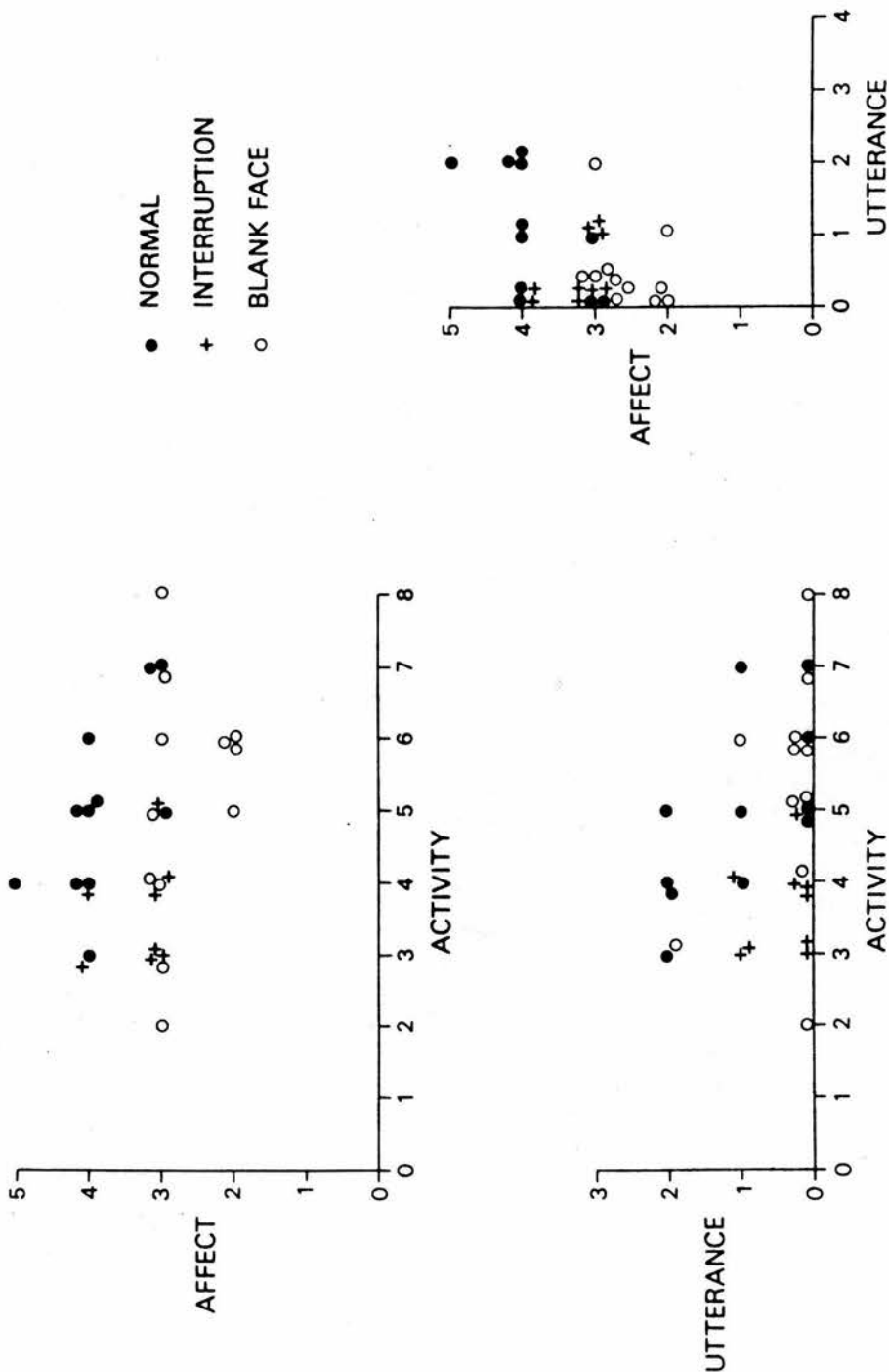
From the act profile codes, it is possible to plot the relationship between pairs of variables for each of the conditions. This was carried out for the relationships between Affect, Activity and Force of Utterance, taking pairs of scores from profiles predominating in each condition, and plotted as shown in Figures 4.II, III and IV. Since the gaze scores did not vary at all in the Normal condition, and hardly at all in the Interruption condition, the other variables' relationship to gaze was plotted only for the Blank-Face treatment, and are shown in Figures 4.Va, b and c.

Although the numbers are too small for any statistical analysis to be done, it is possible to get some idea of the relationship between the various aspects of the babies' behaviour portrayed in these figures across the different conditions.

The relationship between the quality of affect and degree of activity in the three conditions - Fig. 4.II

In the Normal condition there appears to be a negative correlation between the level of Activity and Quality of Affect, that is, when activity level is low, the babies show more positive affect (as calculated from facial expression), whereas when activity level rises, the affect becomes less positive.

In the Interruption condition, the relationship seems to be a tighter one: the range of both affect and activity is both more limited and more subdued than in the Normal condition (3-5 on activity, 3-4 on affect vs. 4-7 on activity and 3-5 on affect in the Normal condition), and the 2 dimensions tend to cluster around a neutral affect state accompanied by a low - moderate level of activity. In the Blank-Face condition, on the other hand, there appears to be no relationship between



FIGURES 4 II, III, IV

Figures showing relationships between pairs of variables in action profiles typical of each condition.

activity level and quality of affect, the generally slightly negative or neutral affect being accompanied by a wide range of activity states.

Force of Utterance and Activity. A very similar pattern emerges in the relationship between the Force of Utterance and Level of Activity (Figure 4.III). Again, in the Normal condition there seems to be a negative relationship, with higher levels of utterance being more often accompanied by quieter activity and vice versa. Again, the range of expression and activity is more limited in the Interruption, there being generally no effort at communication, but when there is some, perhaps a slight tendency in the same direction ^{as with} found in the Normal condition, for the activity of the baby to quieten.

In the Blank-Face condition, as for the relationship between affect and activity, there seems to be a more or less random distribution of activity levels around the different degrees of communicative effort.

Force of Utterance and Quality of Affect + Fig. 4.IV

Just as both affect and utterance showed very similar patterns in relation to activity level, so there tends to be a positive correlation between these two variables in the Normal condition - i.e. the more positive the affective expression, the more likely the babies are to show some communicative effort.

In the Interruption condition the range is more limited, clustering around neutral - positive affect with very little communicative effort. Where there is some degree of effort, however, there may be a slight tendency for affect to be less positive, indicating then that the communicative states with high positive affect observed in Normal interaction do not occur during the time when the mother is interrupted; and thus the quality of communication is very different in the two conditions. In the Blank-Face condition, the level of positive affect is generally lower, and it seems unrelated to the degree of communicative effort.

Gaze and other variables in the Blank-Face condition Fig. 4.V

If the variables above do not appear to relate to each other in the Blank-Face condition in any systematic way, this does not seem to be the case for their relationship to changes in the direction of gaze; and if these findings were confirmed on a wider scale it would constitute important evidence in support of the view that the infants' behaviour in the perturbation is, although somewhat distressed, certainly not random, disorganized and chaotic. Figure 4.V(a) shows the relationship between force of utterance and direction of gaze. Although the numbers are too small to draw any firm conclusions, it does seem as though the infant only makes efforts to communicate when looking at his mother. Moreover, in Figure 4.V(b) we see that there seems to be some systematic relationship between level of affect and direction of gaze: when the infant looks to his mother the quality of affect tends to be more negative than when he is looking away. This supports the view expressed earlier (p. 89) that the infant may be protesting or soliciting his mother's attention during the Blank-Face condition. No pattern of relationship is apparent between the direction of gaze and level of activity in 4.V(c).

Gaze co-occurring with other acts across conditions

The above suggestions are, as has been pointed out, only tentative, since the numbers of common act combinations are too small to permit firm conclusions to be drawn; and it is suggested that one fruitful development of this work would be to obtain enough data to allow more rigorous statements to be made. Nevertheless, it is still possible to look at the overall relationship and degree of co-occurrence between the direction of gaze, and both affective expressions and communicative acts, rather than restricting the analysis to the relationship found only within these commonly occurring act combinations; and in this way examine further, and

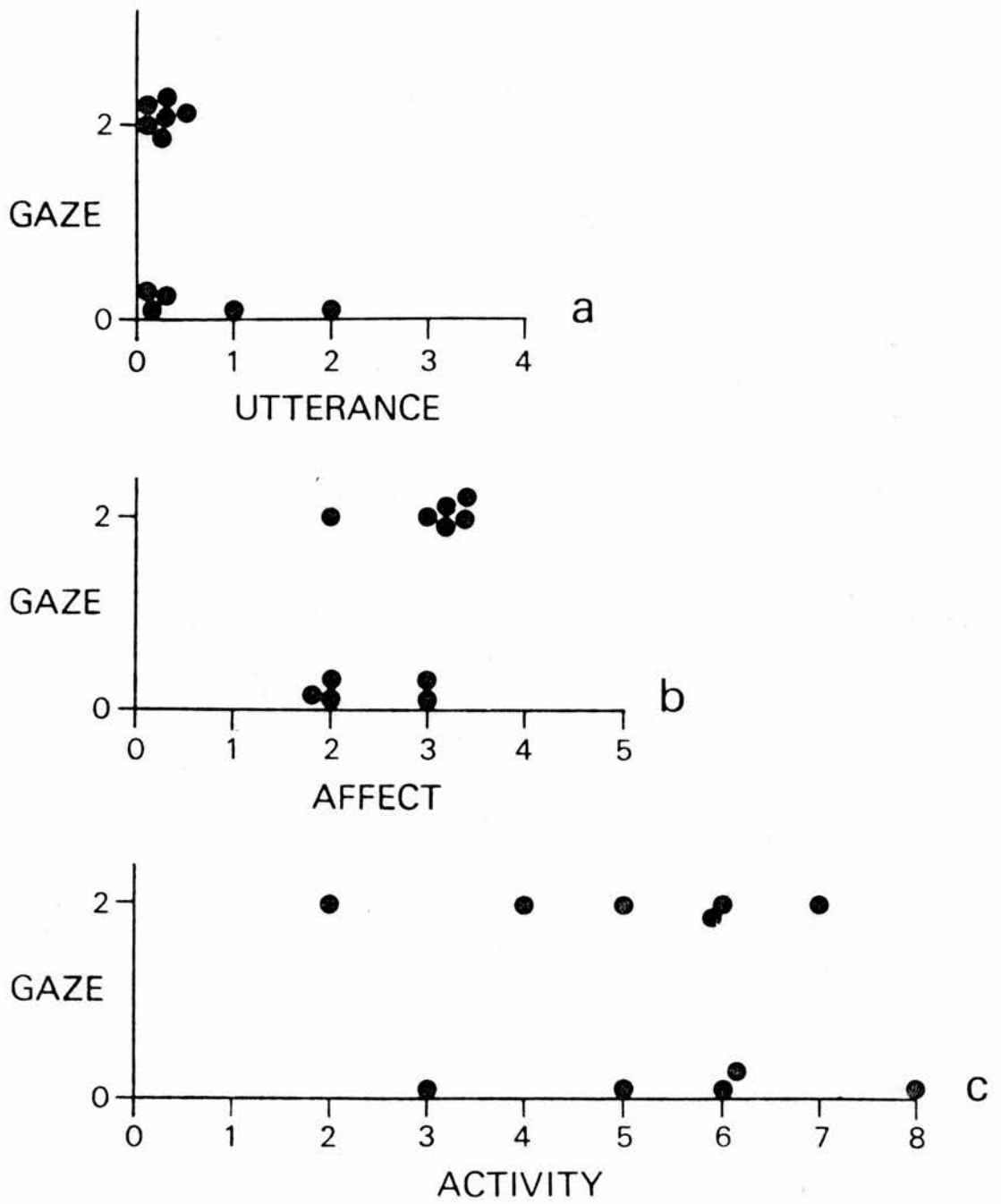


FIGURE 4 V

Relationship between gaze and other variables in
Blank-face condition.

more stringently, the possible associations mentioned above. Thus, the frequency of co-occurrence in the $\frac{1}{2}$ second time blocks was calculated, according to the experimental condition, of looking either to or away from the mother, with a range of acts which were either held to be indicative of the degree of communicative effort, or expressive of either positive or negative affect.

The number of times these pairs of acts co-occurred in the $\frac{1}{2}$ sec. time blocks, expressed as a proportion of condition length, by subject and by session, was then compared with the degree of co-occurrence one would expect to obtain if the two acts in the pair occurred quite independently of each other, calculated by taking the proportion of condition time occupied by Act (a), x the proportion of that condition time occupied by Act (b).

The resulting obtained and expected frequencies were then compared, by subject and session, and submitted to the binomial sign test (after the method of Fogel (1977) to see if the obtained frequencies of co-occurrence differed from those expected by chance to any significant extent. The results are shown below - Table 4.XI.

TABLE 4.XI

Communicative and emotionally expressive acts which show a significant degree of co-occurrence with either looking to, or away from the mother's face, in Normal, Interruption & Blank-Face conditions

a) with looking to the mother's face

<u>Normal</u>		<u>Interruption</u>		<u>Blank-Face</u>	
Tonguing	.1	Tonguing	.01	Wide-open-shape	.1
Wide-open-shape		Smiling	.03	mouth	
mouth	.01			Raised brows	.001
Raised brows	.06			Smiling	.01
Smiling	.06			Pouting	.1
				Frowning	.1

b) with looking away from the mother's face

Neutral expression	.06	Neutral expression	.03	Neutral expression	.01
Relaxed brows	.09	Mouth closed	.09		

Results

Although the data for these results are drawn from the sum total of the babies' behaviour, and the question (which was treated in the case of the act combinations above) of how typical of, or common, certain acts were with respect to each condition is not considered, the results nevertheless may support and extend the tentative suggestions made earlier on the relationship between direction of gaze and expressive or communicative acts, and thus ^{they} similarly constitute evidence on the organization of acts which were only considered individually in the first 3 sections of the results. We see, then, from Table 4.XI that, in all conditions, gazing to the mother's face is accompanied by both communicative acts (tonguing and wide-open-mouth) and manifestations of positive affect, as opposed to the behaviours accompanying looking away where no such active efforts are shown. In the Blank-Face condition, unlike the other two, there is also a tendency for expressions of negative affect to be shown along with looking to the mother, confirming the suggestions, based on the act combination data, that the baby is protesting or soliciting at such times and attempting to re-establish normal communication. In the Normal and Interruption conditions on the other hand, when negative affect is shown, it does not seem to be so systematically related to the direction of attention with respect to the mother.

CONCLUSIONS

The general picture to emerge of the infants' reactions to the different conditions.

If we take the above five different types of description of the baby's behaviour in the various conditions together: the overall frequency of occurrence of the individual acts; the average length of acts; the duration of gaze bouts; the typical action profiles or combinations; and the co-occurrences of other acts with direction of

gaze; we may supplement the picture of the infant's reactions to the different conditions first outlined (pp. 87-89), which was based only on the differential distribution of the individual acts and their durations, with evidence about the way in which these individual acts are organized and relate to each other. In this way we may gain further information about the structure and coherence of the infant's behaviour which would not be clear from the data on the individual acts taken alone. Thus, we see that it is not the case that the separate acts, although individually differentially distributed across conditions, are organized in purely random fashion with respect to one another; for not only may we say of the baby in the Normal conditions that he looks to his mother's face most of the time, makes active movements of the limbs, mouthing and tonguing and smiling frequently, etc. (see p. 87), but also that the looks to the mother's face tend to be longer than in the other conditions, as are bursts of mouth and tongue activity and smiling, whereas any frowns or grimaces are transient. Moreover, when the baby is making active efforts at communication, he looks at his mother and appears cheerful and happy, but quietens his limb activity. Conversely, when making more excited limb movements he is less likely to show such active signs of positive affect or efforts at communication as conveyed by facial expression.

In the Interruption condition we have seen already how attention to the mother falls somewhat compared to the Normal interactions: however, its quality does not change to become positively distressed and nor are the looks away avoidant but are directed to the experimenter: the periods of sustained gaze become intermediate in duration, unlike the fleeting looks which occur in the Blank-Face condition, and are accompanied by some smiles and any communicative efforts (which, however, are less positively affectively toned than is the case in

Normal conditions). Force of Utterance, Activity, Level and Quality of Affect all tend to be moderate to subdued and to show little variation in range. In short the baby appears to be a contented and interested onlooker, gazing alternately from mother to intruder, and quite appropriately not becoming either very excited or trying to communicate with his mother whilst she is otherwise engaged.

During the Blank-Face treatment, on the other hand, the quality of the baby's behaviour changes markedly. He looks away from his mother's face much more and shows signs of distress and displacement activities, such as fingering his face or clothes. Gazes to his mother's face become much more fleeting, or darting, and positive affective expressions and communicative behaviours, when they do occur (and they do so, as in the other conditions, when the infant is looking at his mother's face), are also much more transient, giving the impression of hesitant, uncertain attempts to re-establish communication, attempts which are quickly curtailed in the face of their failing to be developed and sustained by responses from the mother. Looks away are not so closely accompanied by these active efforts.

This study of the form of the infant's responses to these variations in the mother's behaviour has, then, yielded evidence from several different kinds of analysis which together give a picture of infants under three months having considerable interpersonal capacities in both their sensitivity and their expressive powers. These findings have important implications for current theoretical issues on emotionality in infancy, both with regard to its expression and its determining factors, and in relation to the infant's status as a social and interpersonal being. This last issue is discussed at greater length after an account of the effects of further refinements to the perturbation procedures.

It is argued that the two-pronged approach adopted here of refining the perturbatory conditions so as to distinguish between possible alternative theoretical explanations, along with systematic and quantitatively presented descriptions, has helped to clarify issues which were ^{either} clouded due to the situational variables allowing of several different interpretations, or else ^{could} to a lack of descriptive data which ^{could} be shown to be both accurate and representative of a clearly defined sample, and which, therefore, could not easily be questioned. Evidence is presented, then, in these two sets of comparisons, of a range of infant acts and postures in Normal vs. Blank-Face, and Normal vs. Interruption conditions, which reveal in young infants both considerable sensitivity to these subtle changes in the mother's behaviour, and also complex, organized and moreover appropriate and adaptive regulatory behaviour in the face of such changes. These facts lead one to reject the views of those who see infants of this age as reactive only to gross changes in stimulation, where cognitive processing of the content is lacking, and where the repertoire of acts is limited and diffuse (pp. 57-60). Rather, we see a rich repertoire of expressive acts which systematically and coherently vary with changes in the mother's behaviour ^{and} they seem appropriate and adaptive to the different situations; furthermore, the distressed reactions to the Blank-Face situation and apparent attempts to re-establish more normal reciprocal relations demonstrate a measure of commitment and intention to engage in normal communication.

IMPLICATIONS FOR THE VARIOUS THEORIES OF AFFECT AND ATTENTION IN INFANCY

These facts lead us to re-consider the adequacy of the alternative theories mentioned (pp. 48-55, Chapter 2) of affect and attention in infancy.

1) The discrepancy hypothesis

It can be seen from the lack of distressed and affectively negative reactions occurring during the Interruption condition compared to the Blank-Face, and to the patterns obtained in Tatam's work, that accounts of the infants' distress in the latter in terms of the change in style of the mother's behaviour, i.e. an interpretation consistent with the discrepancy hypothesis (outlined pp.48-51, Chapter 2), are inadequate. It has been described how the discrepancy hypothesis has often been advanced to account for quality of affect and degree of arousal across diverse situations in development—ranging from reactions to a blank face presentation at two weeks to stranger fear emerging around seven - nine months when the identity of the mother is thought to have become established (Kagan, 1967, 1971; Hunt, 1965; Hebb, 1946; Berlyne, 1960; Schaffer, 1971; McCall and McGhee, 1976). Several difficulties have, however, been encountered in the working application of the discrepancy hypothesis (see Hunt, 1965; Sroufe, 1978; McCall and McGhee, 1976) and the most pertinent are considered here. One central problem is that in order to generate predictions about the levels and kind of discrepancy required to bring about changes in arousal and affect, one has to establish the nature of the internal schema ^{which} the infant is operating with as a reference. This condition is obviously difficult to meet; and accounts consequently have tended to run into the same problems of circularity and post hoc argument that obtained in definitions of reinforcement. Not only has the indeterminacy of these internal schema been problematic in the operation of the hypothesis, but also the assumption of a regular correspondence between the degree of arousal and affect and quantitative changes in the discrepancy of the stimulus from the standard. The combination of these two problems has meant that researchers have had to resort to extremely cumbersome and unnatural experimental situations in order to

test the hypothesis: for example McCall and McGhee, being aware of the strict requirements which have to be met, consider that no-one had previously used the right stimuli and dimension of discrepancy in getting a 'standard' established which the infant would use and of which he had no previous experience, and in having other stimuli rated as different in equal quantities. In order to test the hypothesis adequately themselves, they found themselves having to use stimuli of great paucity - e.g. presentations of arrows differing in orientation by equal numbers of degrees.

Although the principle of refining down the environment to select parameters has been successfully applied in establishing, e.g. visual capacities to distinguish complexity in very young infants (Fantz) it is clear that caution must be exercised in extrapolating such findings to infer the nature of the infant's spontaneous dealings in a more natural, complex environment. Indeed when more naturalistic studies have been ^{carried} out on the quality and degree of affective expression, a whole range of real world variables are found to be influential which it would seem are much more difficult to submit to the kind of quantitative analysis required. For example, it has been found that familiarization time, order of presentation, the setting, e.g. home vs. lab, the agent, whether the mother is present or not, all influence infants' and children's direction and force of affective expressions (Sroufe, 1978; Bowlby, 1973; Freedman, 1961; Stechler and Carpenter, 1967; making clear the operations of active interpretation and evaluation of complex, qualitative events (Stechler and Carpenter, 1967). Although attempts have been made (Kagan, 1975; McCall and McGhee, 1976) to integrate such contextual factors into discrepancy theory "the event is not just the stimulus but the stimulus in context" (Kagan), the difficulties of categorizing the whole situation in terms that would conform to the requirements

of the hypothesis, are very considerable. On the other hand, if contextual factors are taken into account, but not translated into the quantitative terms of the theory as originally formulated, though added on as a list of other influences, the explanatory power of the theory would be weakened and qualified to such an extent ^{that} it would seem hardly worth retaining.

The difficulties of applying the model in accounts of the expression of affect are evident in several studies. Certainly accounts of stranger fear in terms of a strict version of the hypothesis do not hold up well on several grounds: if the fear is supposed to rest on the ability to distinguish the stranger as different from the mother, then it may be assumed that differences in cognitive ability and attentional capacities would be related to the onset of stranger fear and the degree of affect shown. With regard to the question of onset it is found in fact that infants distinguish their mothers from others in several ways (so apparently meeting the criteria for differentiation) long before signs of fear of strangers are shown (Widmer, 1979; Yarrow, 1963; Dunkeld, 1979). Thus, even if discrimination is a requirement of fearful reactions, it is clearly not sufficient. In a study to test this relationship, Lewis and Brooks (1975) found with seven to 19 month-old infants no relation between the amount of affect expressed and results on discrimination and attention tasks. They also found that the infants showed very little fearful reaction to strange toddlers as compared to fear of strange adults; again the common assumption that a representation of the mother's face is the internal standard against which the stranger is compared fails to account for the comparative lack of fear to toddlers, who in discrepancy terms would be more different from the mother than the strange adult would be. They conclude

"... the differential affective responses to these events can hardly be due to discrimination capacities; rather the nature of the stimulus and its meaning for the infant must be the controlling elements".

Another area where the discrepancy hypothesis falls down, and where it would appear a similar conclusion is pressing, is in the field of early mother-infant face-to-face interactions where, as Stern notes, it is very difficult for the discrepancy hypothesis (yet which he nevertheless upholds) to account for the "long loving looks" which the couple share. Stern points out that according to the discrepancy hypothesis such events should not occur since the very familiar is supposed to attract minimal attention.

It is clear from the above considerations that there are serious shortcomings and problems encountered in trying to apply the discrepancy model to a situation such as mother-infant face-to-face interactions. However, if some attempt is made to apply the hypothesis; and one assumes in a rather simple way, as has been done in several accounts, that the infant has built up a schema of the mother possessing parameters like full face presentation, presence of baby-talk, a certain rhythm and motion; then the Interruption condition here, involving a change in all these dimensions, should be assumed to constitute a more discrepant presentation than both Tatam's perturbatory condition (see p. 45) (since the former involves the addition of profile presentation) and a normal interactive sequence, and thus produce an increase in negative affect comparable to that obtaining in the Blank-Face condition. Since this is not the case, we have to reject the explanation in terms of discrepancy as outlined here. On the other hand, we should acknowledge that the theory may have validity once complex evaluative processes are integrated into it, and has an important place in an understanding of general reactions to cognitive conflict involving inconsistent beliefs (Donaldson, 1978).

2) Contingency theory

As outlined in the Introduction (pp.15-18) and at the beginning of

Chapter 2 (pp. 52-53), contingency or learning theorists such as Papousek or Watson, who have addressed themselves to the problem of social interactions and development, have assumed that the manifestations of pleasure and excitement shown by infants whilst a partner attends to and plays with them represent, not joy at sharing an experience with another person like themselves, but [redacted] the establishment and maintenance of predictive control through the operation of what Papousek (1975) terms, "a fundamental cognitive response system" underlying all others, involving the input and processing of information, and ensuring control over the environment and one's own acts. Like the discrepancy hypothesis, and as noted (p. 81), this theory too would predict the Interruption condition to be just as distressing for the baby as the Blank-Face condition since in both cases the contingency between the baby's acts and the mother's is lost. The results presented above show that this is not the case; and, indeed, several other studies and considerations indicate the shortcoming of this theory as a general explanatory account of the direction of attention and quality of affect.

Although one would not want to deny that contingent relations represent an important component of the process of interaction, and indeed, as Tronick et al point out (Tronick et al, 1979), simple contingencies can be shown to exist between adult and infant displays of short durations, in smiles, eye-to-eye contact and vocalizations (Lewis & Freedle, 1973; Bullowa, 1978; Ambrose 1961; Fogel, 1977), [redacted] one would not want to reduce all that obtains to the effects of the perception of contingency.

The Form of Reinforcement

It has been noted above that other aspects of the reinforcing situation, such as the form of stimulation, have to be taken into account (see pp. 16-17). It was mentioned how the conditioning of infant vocaliza-

tions failed to occur with non-human reinforcement, whereas it had been successfully ^{achieved} with human social stimulation (Rheingold et al, 1959; Weisberg, 1963). This same effect, showing the infant's perception of the distinction between human and non-human stimulation, has also been shown in the work of Sylvester Bradley and Trevarthen (1978) and Dunkeld (1979). A similar conclusion also results from Valentine's (1930) study of fearful behaviour, in which he notes, in the course of his experiments with conditioned fear responses, the very interesting fact that fear could be induced by association and suggestion in relation to creatures, or physical objects such as the swelling sea, where some kind of intentional structure seems attributable, but ^{that} no conditioning of fear could be achieved with objects in which no such intentional or animate qualities inhere e.g. a pair of opera glasses, or a bottle of pills.

However, the results of the experiments conducted here indicate that the problem of form of stimulation for contingency theorists is a much more fundamental one than that entailed in the animate/inanimate distinction; for we have seen that young infants perceive differences (which, moreover, their emotional expressions would indicate they find important) between much more subtle varieties of noncontingent behaviour both sets of which are provided within a short time interval by their mother.

3. Conflict and Intersubjectivity Accounts

It has been seen already that our results have tended to support the predictions generated by the motivational conflict and intersubjectivity theories outlined on pp. 82-85, both in the nature of the discrimination shown and in the way in which it is expressed. We are led to conclude that an acknowledgement of the importance of the form of the mother's response must, in these instances at least, incorporate some notion of the appropriateness of the partner's reactions in personal terms which cannot be reduced to physical parameters such as those of

timing. This kind of quality has already been noted as important by attachment theorists (e.g. Ainsworth, 1974) in describing components of mothering such as mood setting, acceptance, cooperation and the appropriateness of the affective climate, as well as in the psycho-analytic literature (see Introduction, pp. 28-29 on Winnicott's idea of holding). The conflict and intersubjectivity theories, in particular, have argued that the infant is innately equipped both to perceive qualities only possessed by other agents like themselves, e.g. the detection of attention or the quality of affect; and, moreover, that the infant is motivated to achieve some correspondence and coordination between his own initiatives and the attentions of others and to have the former accurately acknowledged and appropriately complemented. Such skills to perceive the intentional and affective structure of others' acts and the ability to relate them to one's own appear fundamental and to underly later, more sophisticated, manifestations such as the 'human sense' displayed in children of nursery school age, who readily respond to certain human actions as more sensible and appropriate than others (Donaldson, 1978).

USEFULNESS AS A DIAGNOSTIC TOOL

A complex profile of behaviour has been shown to be systematically, if briefly and reversibly, provoked by the mother's withholding responsiveness from her baby in the Blank-Face situation. It has been argued that such effects can be specifically attributed to a breakdown in the process of interaction and reciprocal communication between the two partners rather than to any discrepancy from a standard of physical dimensions which the mother demonstrates in her non-responsive behaviour, or to the cessation of contingent relations alone.

It might be thought that this regularly obtained behaviour profile would also reflect breakdown in the emotional rapport or communication

process in naturally occurring situations and might therefore be useful as a diagnostic tool to detect pathology in either partner alone or in the relations between them.

This hypothesis was quite by chance confirmed during the course of the research for this thesis.

A mother volunteered to bring her baby (D.S.) to be filmed in the study outlined above when the baby was eight weeks old. The usual procedures of chatting to the mother and waiting until the baby seemed contented and alert were followed before filming began. During the period of Normal interaction this baby showed to an exaggerated degree almost all the facets of the behaviour profile evoked in the other babies during the Blank-Face condition apart from the sustained efforts to communicate. See Table 4.XII and Appendix II. Along with this generally avoidant and apathetic behaviour, quite lacking in the cheerful and happy communicative expressions usually seen in infants of this age, the mother seemed, understandably, anxious, and made constant but unsuccessful efforts to attract her baby's attention, appearing in so doing, rather intrusive - constantly touching the baby's head to draw him round to look at her, and adjusting his body posture towards her. Their clear, and moreover public, failure to establish a happier interaction must have been distressing to the mother, and although every reassurance was given when filming stopped, she unfortunately felt unwilling to come in for further sessions over the following weeks. It was felt that any more pressure on her, or initiatives on our part, would possibly further contribute to her difficulties, and she and the baby were not seen again for a while.

It transpired from later contact with the mother and examination of medical records that she had either suffered from a severe postnatal depression or else ^{had} a serious personality disorder provoked by the pregnancy and birth of her child (this is according to the psychiatrist's

report). Birth records showed that the baby had been full-term ^{and} had had a normal delivery with no neonatal problems. He was admitted to the Edinburgh Sick Children's Hospital on three occasions between the ages of three weeks and six months, ^{because} the mother was totally rejecting of him, making efforts to have him adopted; and the safety of the baby seemed at stake. On these occasions, extensive medical notes on the baby show no mention of physical, neurological or behavioural abnormalities.

The baby's apparent physical well-being, as assessed by the medical staff at birth and during his subsequent hospital admissions, plus the fact that the mother's feelings of anxiety and depression started during the last three months of pregnancy, make it seem likely that in this case her depression was not the result of those characteristics of her baby which made him unresponsive during her attempts to interact with him, ^{was} but rather their cause.

This conclusion is also supported by the two cases cited by the Robertsons (see p.41). The particular point of interest here is that the complex behavioural profile consistently provoked in the Blank-Face condition in babies of this age largely coincides with that which obtained in this infant where the mother was clinically depressed. The only difference was that in this case the baby did not show the same features suggesting protests, or soliciations for responsiveness, which are seen in the Blank-Face perturbatory period. The other characteristics, however, were shown to an extreme degree. This may indicate that his mother's prolonged state of depression and rejecting feelings had caused him to give up such active attempts, and that he had entered a phase of more total withdrawal resembling features of the autistic syndrome. In spite of this difference the case confirms the potential value of taking careful note of the behaviour patterns provoked in the perturbatory procedure here. The profile of behaviour in this baby, when in a

face-to-face interactive situation with his mother, was different from that normally seen in an immediately obvious way where other, more physical, indices had failed to reveal any abnormality. This suggests the potential value of using the descriptive parameters applied in the work here in developing criteria for psychiatric evaluation which, according to Cytryn (see p. 63) are currently not available.

TABLE 4.XII

Table showing overall frequencies of acts as percentage of condition length which are significantly differentially distributed across Blank-Face and Normal conditions (averaged for all babies and sessions), and their results for D.S.

<u>Act</u>	<u>Normal</u>	<u>Blank-Face</u>	<u>D.S.</u>
A. <u>Attention:</u>			
to mother	88.8	64.5	18.8
gaze away	9.8	34.2	64.3
B. <u>Communicative effort</u>			
mouth relaxed	38.8	32.2	16.4
C. <u>Affect</u>			
a) <u>positive:</u>			
eyebrows raised	31.2	13.8	1.9
eyebrows relaxed	43.3	27.4	16.0
smile	31.8	4.2	0
b) <u>negative:</u>			
(i) distressed:			
eyebrows frown	9.2	30.1	54.9
raised frown	16.2	28.8	27.2
(ii) displacement:			
L hand touch			
clothes	22.2	30.7	45.5
grimace	0.1	10.0	18.3
pout	0.1	2.4	0.5
yawn	0	0.4	4.7

CHAPTER 5

THE EFFECTS ON THE INFANT OF INAPPROPRIATE TIMING
OF THE PARTNER'S BEHAVIOUR (a)

Following on from the study of the infant's reactions to the Interruption and Blank-Face situations, it was decided to refine the perturbatory procedures further, and ^{to} present the infant with a different kind of unresponsiveness to that occurring in the Blank-Face situation, in order to gain more evidence about adaptive functions and the baby's sensitivity at this age to the various parameters of interactive behaviour.

In particular, attention was directed to the effects of an active partner expressing all the features of baby-oriented behaviour but in an inappropriate and uncoordinated way with respect to the ongoing expressions and activity of the baby.

Pilot study with a six-week-old baby girl

METHOD

Design. In this pilot study, an attempt was made to achieve this kind of presentation merely by asking a colleague with long experience of dealing with babies of this age first, to interact normally with the baby for one minute (C1). She then was required to carry on behaving in the same style but without making her behaviour responsive to the activity of the baby for an interval of $1\frac{1}{2}$ minutes (C2), ^{This was} followed by a brief period of normally responsive behaviour ($\frac{1}{2}$ minute). The decision to use a colleague rather than the mother as partner was taken because it was felt that the mother would find the task of being actively unresponsive to her baby too difficult (see Stern, 1974).

Procedure

The same procedures for recruitment and transport to the laboratory applied as for the other subjects.

The baby was fed and changed on arrival. When the baby was fully alert the mother came into the observation room whilst the partner was being filmed with the baby. Positioning of the baby, partner, mirror and camera was the same as for the previous experiments.

The categories of baby behaviour to be analysed and scored were initially those which had significantly differentiated between Blank-Face and Normal conditions previously, and once again a $\frac{1}{2}$ second time interval was taken as the unit for scoring.

As this was only a pilot study, only the distributions across Normal and unco-ordinated conditions of the individual acts and their average lengths were considered, along with the data on gaze bouts.

RESULTS

Since only one session was carried out with a single baby, it was felt that statistical treatment of the data was inappropriate.

Overall frequencies of acts between the two conditions

The averaged scores for all babies and sessions for those acts, referred to above, which were significantly different between Blank-Face and Normal conditions in the previous experiment, are shown in Figure 5.I(a) -(1) as proportions of condition lengths. Alongside them, the distributions of these same acts, as proportions of condition lengths, are shown for the main Normal condition of this pilot study (N) and the Unco-ordinated condition (UC).

It can be seen from these figures that, although the actual scores at times differ by as much as 30% of condition length, the patterns of distribution between the Normal phases and the two kinds of perturbatory conditions are very similar in all cases but one (mouth relaxed), with the distribution changing in the same direction in both sets.

Since act 26, mouth relaxed, showed a difference in the change of direction, the other acts indicating Degree of Communicative Effort were

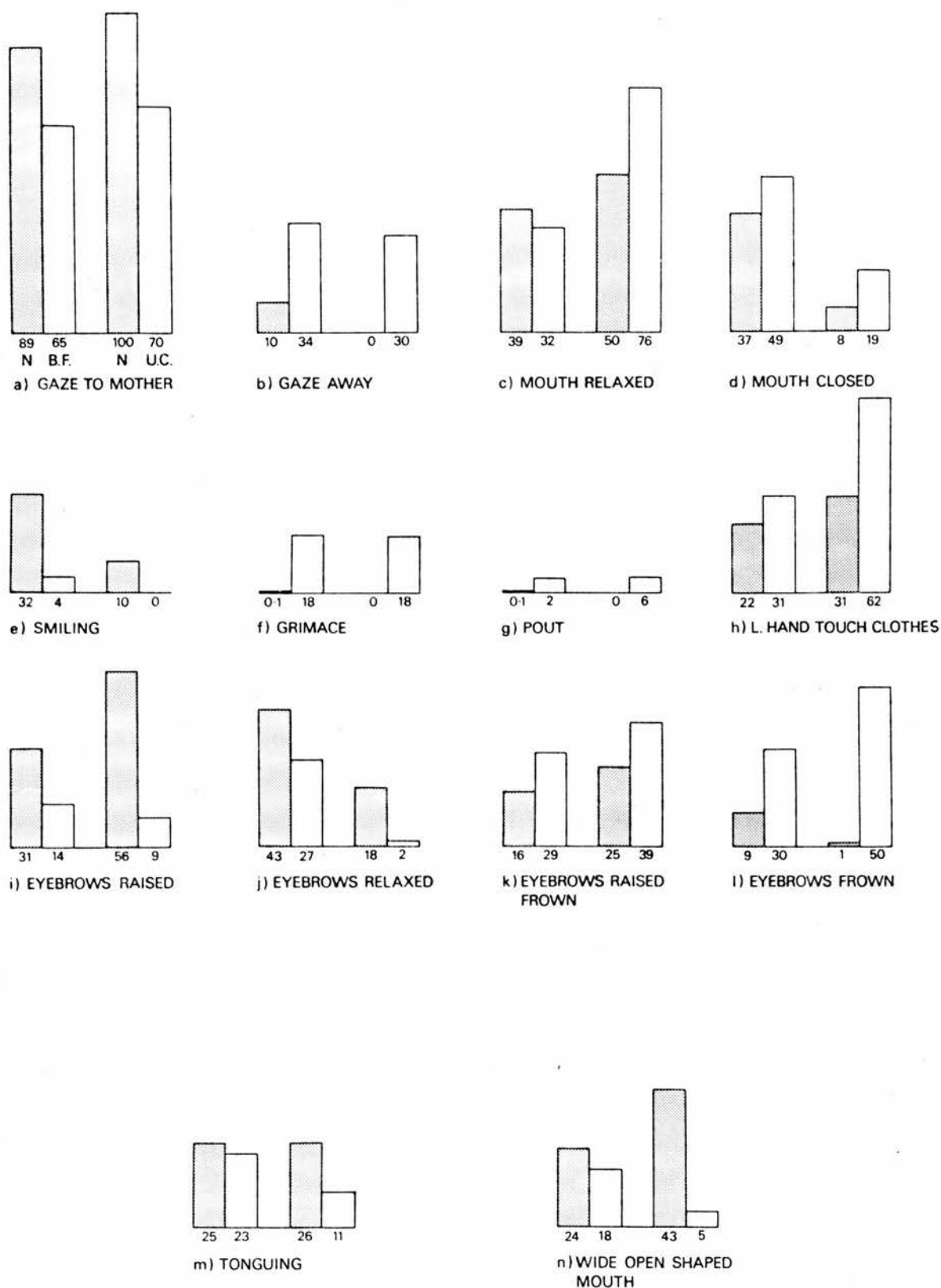


FIGURE 5 I

Distribution of overall frequencies of occurrence of acts between Normal and Blank-face conditions, and between Normal and Uncoordinated conditions. Pilot study (a).

also examined (see Fig. 5.I(m) and (n)). Here, in this pilot study, it is seen that these active communicative acts, which are not significantly differently distributed between the main Normal vs. Blank-Face conditions, considerably diminish in the Unco-ordinated condition.

Average Act Lengths

Just as with the analysis above on overall frequency distribution, only those acts where the Average Act Length, as a proportion of condition, differed significantly between Blank-Face and Normal conditions in the previous study were examined and compared in this case. The results for these acts, pooled for all subjects and sessions, for Blank-Face and Normal conditions are shown in Figure 5.II and alongside them the results obtaining in this pilot study for the first Normal (N) and the Unco-ordinated (UC) conditions.

It can be seen that all those acts which differed in this way across the Normal and Blank-Face conditions showed the same pattern of change between the first Normal and Unco-ordinated conditions here.

Gaze Bout Lengths

The durations of Gaze Bouts - a bout being defined on p.98 as a period of gazing to the partner separated by any period of looking away - were categorized in the same way as in the last experiment;

3 categories:

- 1) glances - those lasting $2\frac{1}{2}$ seconds or less;
- 2) intermediate looks, lasting between 3 and 5 seconds, and
- 3) long looks - those of more than 5 seconds.

The total number of looking bouts was calculated for both the main Normal and Unco-ordinated conditions, and then the number of bouts in each of the above categories was expressed as a proportion of the total number of bouts in that condition.

The resulting proportions are shown in Figure 5.III. Again the results show a very similar pattern to that obtaining between the Normal

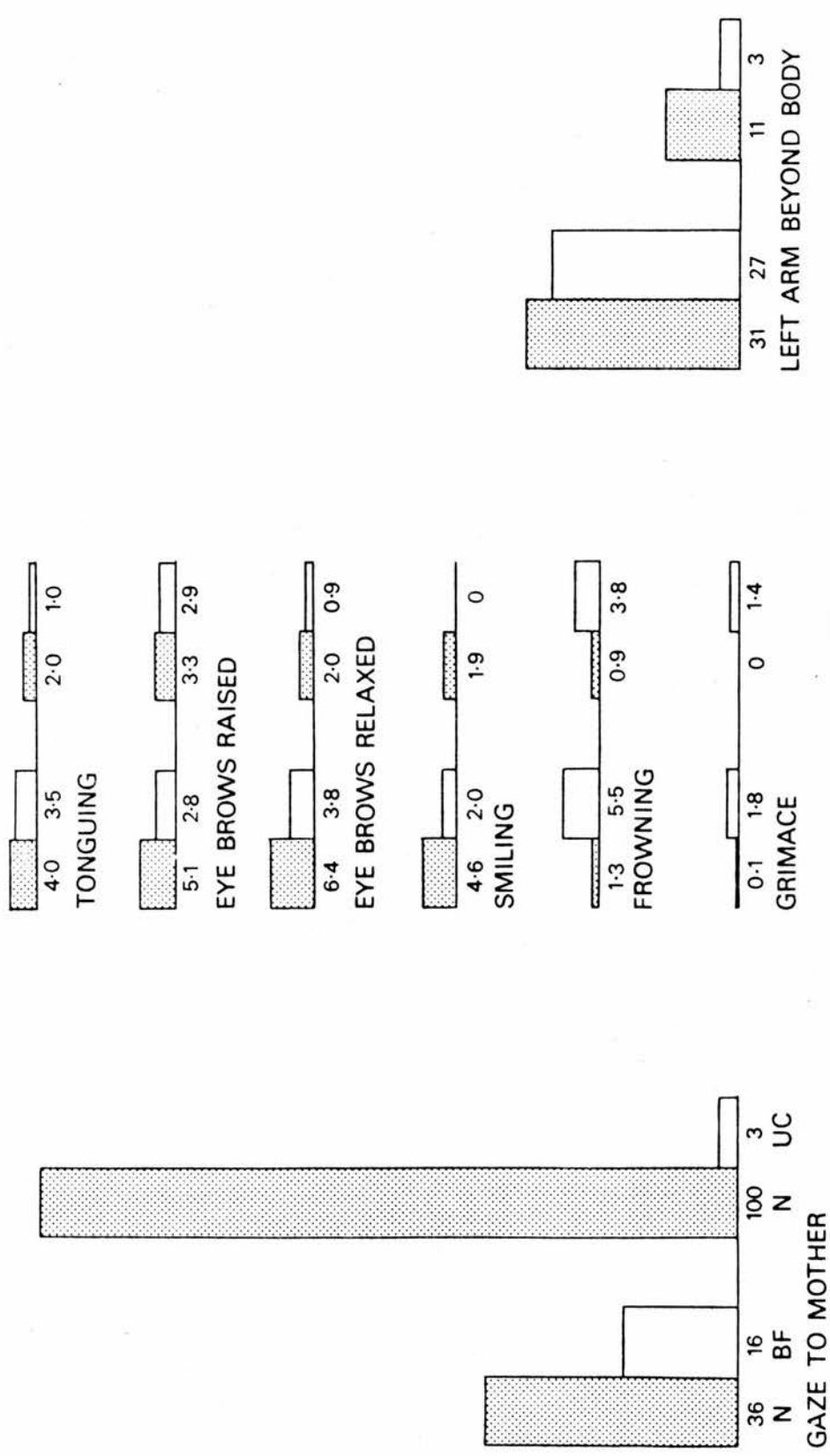


FIGURE 5 II

Distribution of average act lengths (as proportions of condition time) between Normal and Blank-face conditions, and between Normal and Uncoordinated conditions in pilot study (a).

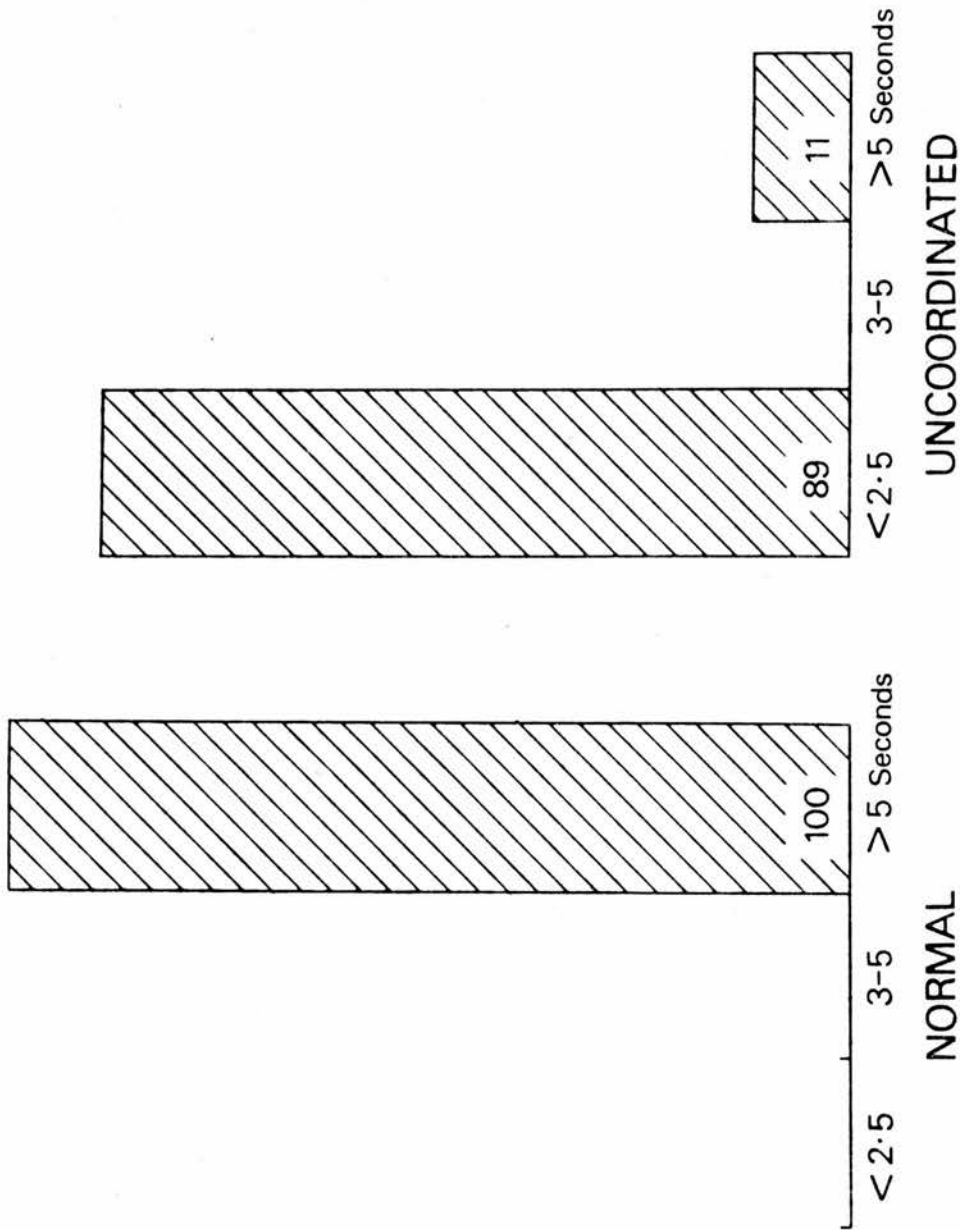


FIGURE 5 III

Frequency histograms for gaze lengths as in Figure 4 I. Pilot study (a) showing very large effect of partner's uncoordinated response.

and Blank-Face conditions. In the Normal condition, here, the only gaze bout is a long one, whereas in the Unco-ordinated condition, most bouts (88.5%), are glances; none are of intermediate length and only 11.5% are long looks.

DISCUSSION

Note on the behaviour of the partner during the out of phase condition

Although every effort was made by the partner to keep the style of her baby-oriented behaviour constant throughout the Normal and Unco-ordinated conditions, she found the task difficult; and in the Unco-ordinated condition her behaviour, in fact, changed in several ways. She tended to make many more side-to-side head movements than she had been doing before; her movements themselves both quickened and were less consistent than previously, especially facial expressions, which also appeared more exaggerated. These changes obviously mean that the requirements of the design were not fulfilled. However, they are interesting in themselves for they are consistent with other reports of the difficulties experienced in trying to either withhold responsiveness completely, or consciously changing one's style (Stern, 1974a). Moreover, they indicate a significant contribution from the baby, probably at the level of his ongoing activity in relation to the partner's, in provoking the features of "motherese". If the mere presence of the baby were the only contribution, then pursuing the same style, but making it inappropriate to the infant's behaviour, should present no difficulty. This issue is considered further in Chapter 7.

Comparisons between the results of this study and the effects of Blank-Face presentations

Almost all the major changes provoked by the Blank-Face presentation are replicated in the Unco-ordinated condition here, in all three types of description. Attention to the partner drops and signs of distress

and displacement activities are shown. The average durations of expressions of pleasure and positive communicative acts are more prolonged in the Normal condition, whereas for more negative expressions the relationship to conditions is the opposite of this. Gaze to the partner is continuous in the Normal condition, but takes the form of short glances in the neo-ordinated presentation. The exception is that the degree of communicative effort, which remains constant from Normal to Blank-Face conditions, falls here in terms of overall frequency, and seems to account for the relative increase in mouth relaxed postures. It is not clear, of course, whether this would be a general result of this kind of presentation to the baby, and it would be interesting to replicate and test this further, for it might indicate that babies appear to feel that it is more appropriate to try to gain some reaction from a totally unresponsive partner, whereas this is not the case when the partner is active but behaving unresponsively.

CONCLUSIONS

The results presented above suggest that the baby showed appropriately distressed reactions to the partner's unnatural interactive behaviour in the co-ordinated condition, and a finer sensitivity to the partner's communicative acts than had been demonstrated in the first experiment, since the presentation here constituted a less gross distortion of style than that occurring in the Blank-Face situation. This suggestion is, of course, also supported by the fact that the Interruption condition had appeared not to be a distressing event, whereas the co-ordinated condition did seem to be perceived as such, and the differences between the Interruption and neo-ordinated conditions are much finer than those between Blank-Face and Interruption conditions. Obviously, the study would have to be replicated with more subjects, using the mothers as partners, for these tentative suggestions to be confirmed.

It is not possible, either, to state confidently, on the basis of the above study, that the baby is sensitive purely to alterations in the relationship between the partner's acts and his own, irrespective of changes in style, since, in fact, behavioural differences did occur in the Unco-ordinated condition. An attempt was next made therefore, to create a situation which would get round the difficulties of stylistic changes encountered here.

THE EFFECTS ON THE INFANT OF INAPPROPRIATE
TIMING OF THE PARTNER'S BEHAVIOUR (b)

In view of the difficulties encountered by the partner in the study above, in keeping her style of behaviour consistent throughout Normal and Unco-ordinated conditions, and thus the failure to fulfil the aims of that study, a situation was arranged which, it was hoped, would remove these problems, and a second, more extensive pilot study was carried out (at the Max Planck Institute for Psychiatry in Munich in the research group led by Dr. H. Papousek).

It was thought that the task for the mother or other partner would be easier, and therefore greater consistency ^{would be} achieved, if, instead of having to look throughout at a baby, with whom she had not to interact in the Unco-ordinated or inappropriate condition, she could, during this interval, act out a conversation with an image of her baby behaving socially and responsively to her.

METHOD

Design. In order to achieve the situation described above, a $2\frac{1}{2}$ min. colour film of the baby, head and torso and full face presentation, was taken while he was interacting with his mother, and this film, projected immediately above the baby's head, then provided the "stimulus" for the mother to interact with during the Unco-ordinated condition, following on a period of normal communication. Mother and baby were filmed throughout, and the baby's reactions to these two situations compared.

Subjects

Two babies, one boy and one girl, were recruited for the study, and each was seen at both seven and eight weeks. They and their mothers were contacted through the local maternity hospital. Both babies were primiparous, full-term and normally delivered. Both mothers were German.

Apparatus

The positioning of mother, baby and equipment is shown in Figure 5.IV. Mother and baby were seated opposite each other, about 18" apart. Behind them a mirror was placed so as to give a full face reflection of the baby's facial expressions and arm movements. A projector stood beside and just higher than the baby, and during the unco-ordinated condition displayed a life-size, full-face colour image of the baby on a screen immediately behind and just above the baby's head. The projector motor was kept running throughout the session, so that the noise level would not suddenly increase during the display for the Unco-ordinated condition. However, although the projector was out of the baby's sight, no control was possible for the variation in reflected light across conditions. The session was filmed with a Bolex cine camera placed to film the profiles of mother and baby, and the baby's reflection in the mirror. 100' Tri x reversal film was used for each of the 4 sessions at 12 frames per second, giving about 5 minutes of film each time. It was felt, on the basis of the analysis carried out on the data from the previous experiments, that no data of any significance for the purposes of this study would be lost by filming at this slower speed, whereas it meant a great saving on film.

Procedure

Mothers and their babies were transported to the Institute by taxi, and the usual procedures of feeding, changing and making sure that the baby was alert and contented were followed before the session began. When the baby and mother were ready they were shown into the room where filming was to take place. The baby was strapped into an infant seat and the mother, seated opposite, was asked to chat naturally to her baby for approximately $2\frac{1}{2}$ minutes, and then, when the projector operated by a colleague (who sat out of the mother's and baby's sight) began to show

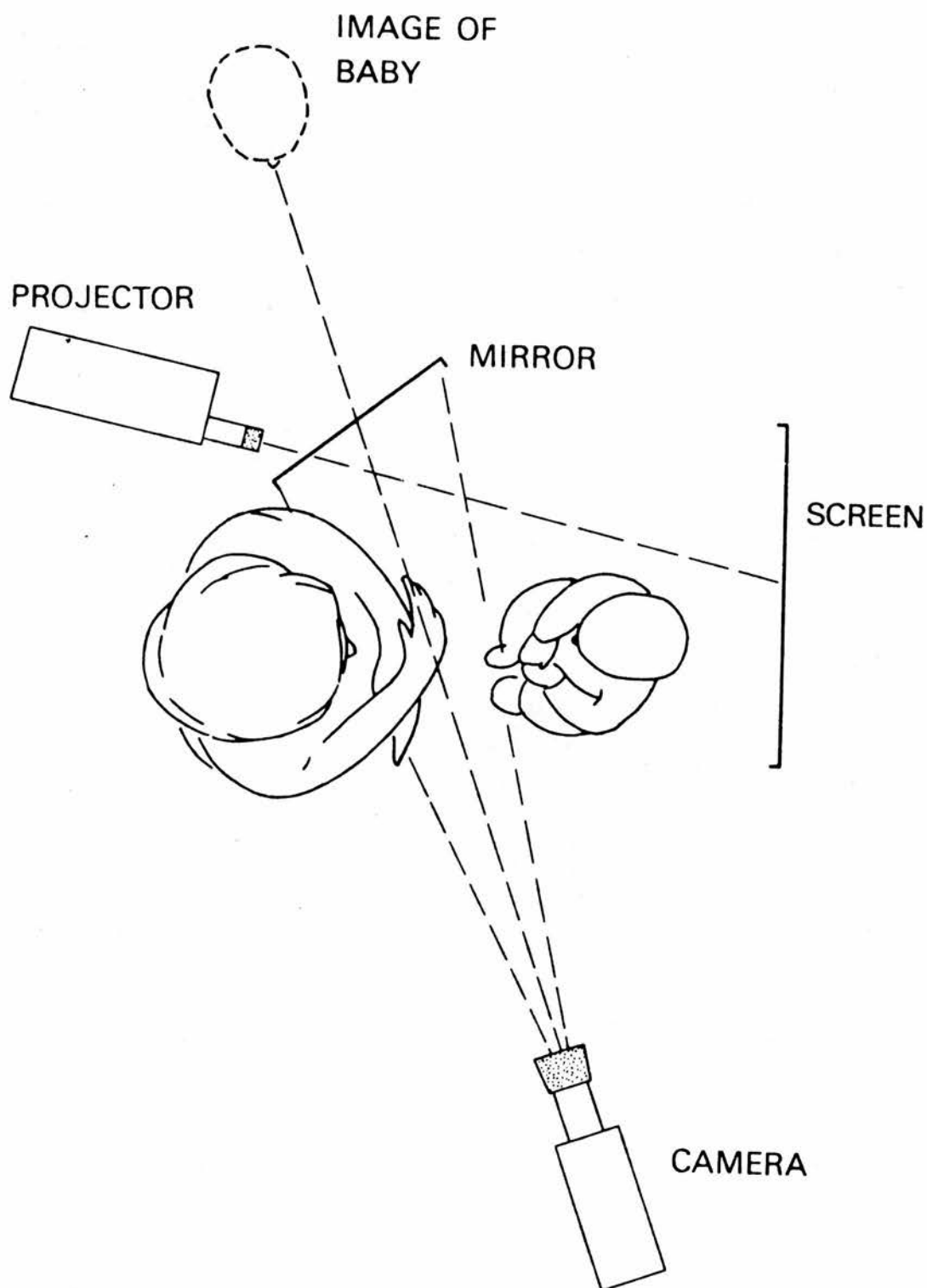


FIGURE 5 IV

the film of the baby, to stop responding to her real baby, and "chat" to the projected image for a further $2\frac{1}{2}$ minute period.

Analysis of data

The cine film of the babies' reactions to these two conditions, Normal interaction and Unco-ordinated, constituted the data for analysis. The behaviour categories, which were analysed in the previous experiments, were again scored in $\frac{1}{2}$ second time intervals, the image of the mother being obscured during analysis.

The same five types of comparison of activity in these two situations were made as for Blank-Face, Interruption and Normal conditions in experiments I and II, i.e.

- 1) the distribution across conditions of the individual acts, in terms of their overall frequencies;
- 2) the distribution across these two conditions of the average durations of the above acts;
- 3) the patterns of gaze bouts;
- 4) the most common act combinations or profiles in each condition;
- 5) the co-occurrence with direction of gaze to and away from mother of communicative and emotional expressions across the two conditions.

Hypothesis

It was hypothesised that if infants are sensitive to the timing of the partner's actions in relation to their own, and moreover are motivated to maintain mutually reciprocal communications, then the unco-ordinated condition should provoke systematic differences in the infant's behaviour of the kind which were predicted to occur in the Blank-Face situation, see p. 78 and Table 4.II above.

RESULTS

- 1) t-tests were carried out on the distribution across conditions of the frequency of occurrence of individual acts, expressed as proportions

of condition lengths, for all four sessions. The results are shown in Table 5.I.

The results confirm the predictions outlined in Table 4.II for 24/35 acts, with 16 acts differing between the two conditions in the predicted direction (although in three cases this is only a non-significant trend). As in the other perturbations, expressions of emotion and the direction of attention are generally the most systematically sensitive to the changes in the partner's behaviour, whilst limb postures do not differentiate. Thus, during the Unco-ordinated condition here, gaze to the mother drops (from 84.5% to 33.7% time), and conversely gaze down and away from her, and hand regard, increase. Rate of smiling, raised and relaxed eyebrow postures fall, whereas frowning, handling clothes, fingering the face, grimacing, pouting, biting the lower lip and yawning all increase. On the other hand, six cases where directional predictions fail to be confirmed involve hand and limb activity or body posture (acts 14a, 9, 18, 20, 33, 37) (four of which had also failed to differentiate between Blank-Face and Normal conditions).

Three of the remaining predictions which are not confirmed consist of communicative acts: rather than remaining actively communicative in the Unco-ordinated condition, the babies' level of visible tonguing activity and wide-open-shaped mouth postures fall. The mouth is more often closed, whilst relaxed mouth postures remain constant, and in these respects the pattern of results differs from that found in the Blank-Face condition, where communicative effort remained constant but replicate the pattern found in the Unco-ordinated condition in the pilot study above.

2. Average duration of acts across Normal and Unco-ordinated conditions

The results of t-tests performed on the average durations of each act for each subject and session, between Normal and Unco-ordinated

TABLE 5.I

Table of t-test results showing the differential distribution of acts across Normal vs. Unco-ordination conditions in terms of overall frequencies

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Unco-ordinated</u>	<u>Sig. level</u>
A. <u>Attention</u>				
1	to mother	+	-	.005 1 tail
3	away from mother	-	+	.0005 1 tail
4	own hand	=	+	.1 1 tail
B. <u>Communicative Effort</u>				
24	Tonguing	+	-	.01 2 tail
25	Wide-open-Shaped mouth	+	-	.01 2 tail
26	Mouth relaxed	=	=	NS
26a	Mouth closed	-	+	.01 1 tail
C. <u>Affect</u>				
<u>Positive</u>				
14a	L palm open	=	=	NS
23a	R palm open	+	-	.05 1 tail
34	Eyebrows raised	+	-	.01 1 tail
35b	Eyebrows relaxed	+	-	.1 1 tail
36	Smile	+	-	.05 1 tail
37	Head up	=	=	NS
<u>Negative</u>				
9	(i) distress: L arm thrash	=	=	NS
18	R arm thrash	=	=	NS
32	Crying			NE
35	Frown	-	+	.005 1 tail
35a	Raised frown	=	=	NS
(ii) displacement:				
10	L hand touch clothes	-	+	.1 1 tail
19	R hand touch clothes	-	+	.025 1 tail
11	L hand touch face	-	+	.025 1 tail
20	R hand touch face	=	=	NS
28	Grimace	-	+	.01 1 tail
30	Pout	-	+	.025 1 tail
27	Chew	=	=	NS
29	Bite lower lip	-	+	.025 1 tail
31	Yawn	-	+	.025 1 tail
33	Suck thumb	=	=	NS
D. <u>Activity</u>				
6	L arm below shoulder	=	=	NS
15	R arm below shoulder	=	=	NS
7	L arm above shoulder	=	=	NS
16	R arm above shoulder	=	=	NS
7a	L arm at side	=	=	NS
16a	R arm at side	=	=	NS
8a	L arm beyond body	=	=	NS
17a	R arm beyond body	=	=	NS

conditions are shown in Table 5.II with 2 tail levels of significance applied. Sixteen acts are differentially distributed, with their average durations significantly changing across these two conditions. Just as with other results for the average durations of acts, it is generally found that this measure follows the same directional pattern as for the distribution of acts in terms of overall frequency of occurrence (29 out of 35 acts follow the same patterns here). In four cases the average act length does not alter where overall frequency had varied, and with two acts (right arm above shoulder, and raised frowns) the reverse is the case.

As for the overall frequency results, those acts which alter in their average duration according to condition are predominantly expressions of attention, affect and communicative effort (fifteen cases) rather than limb postures, where average act duration tends to remain constant. Those expressions of attention to the mother, active communicative efforts and expressions of pleasure that differ in their durations, are more prolonged in the Normal condition whereas 'displacement' activities, grimaces and frowning, tend to be more prolonged in the Unco-ordinated condition, and ^{more} fleeting in the Normal interaction.

3. Gaze bouts

The proportions of the total number of gaze bouts in each of the two conditions here, which fell into each of the categories glances, intermediate and long looks, described above (p. 98) are shown in Figure 5.V.

As in the comparison of Normal interactions with the Blank-Face, and with the Unco-ordinated condition in the first pilot-study, a far greater proportion of long looks is found to occur during the period of Normal interaction (81.8% of that condition's gaze bouts), whereas only 13% are short, fleeting looks, and very few are of intermediate length. In the Unco-ordinated condition, on the other hand, most gaze bouts are

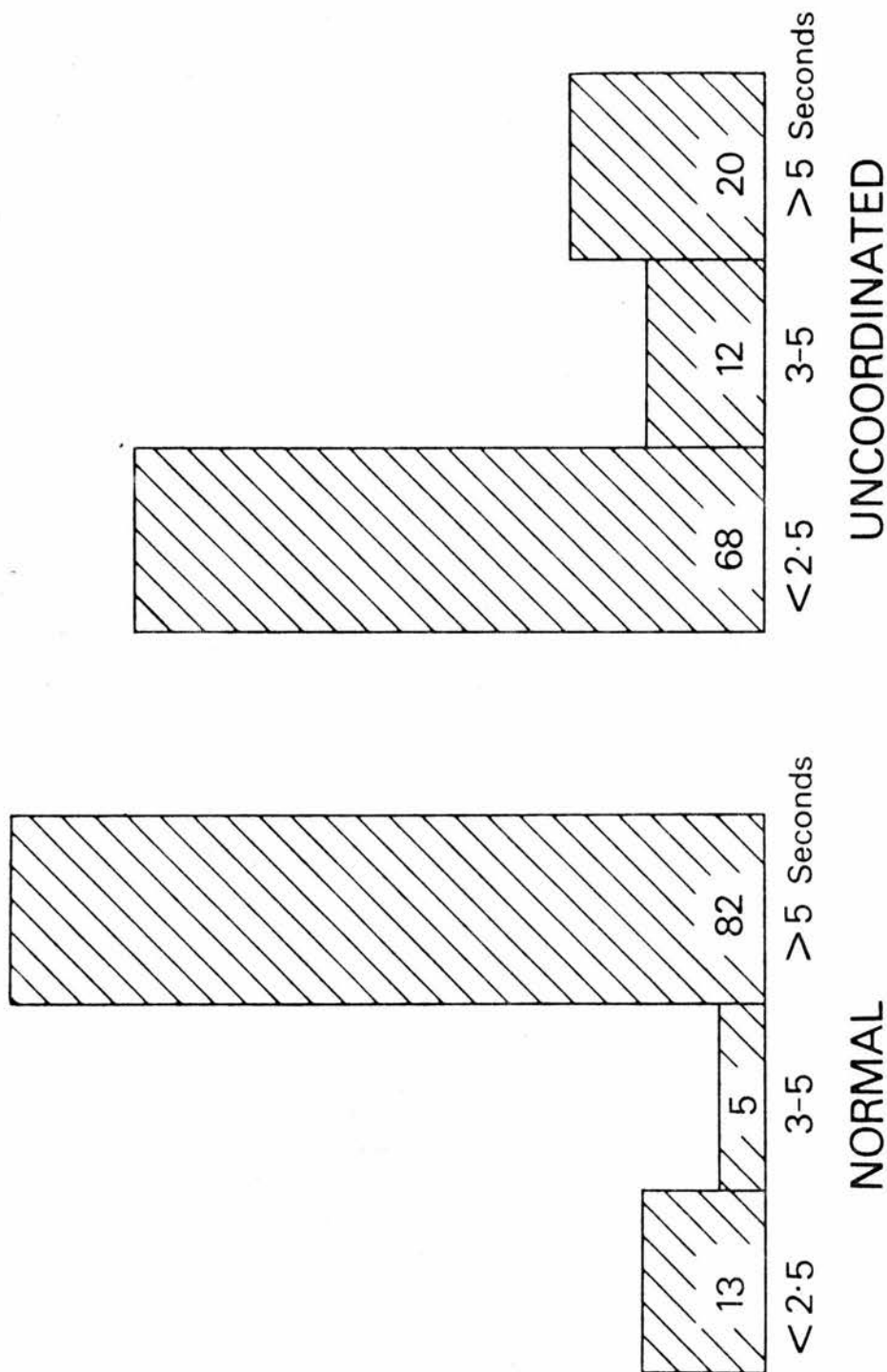


FIGURE 5 V

Frequency histograms for gaze lengths as in Figure 4 I, showing pronounced reduction in gaze length with uncoordinated maternal response. Munich experiment.

TABLE 5.II

Table of t-test results showing the differential distribution of acts across Normal and Unco-ordinated conditions in terms of average act lengths

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Unco-ordinated</u>	<u>Sig. Level 2 tail</u>
<u>A. Attention</u>				
1	to mother	+	-	.001
3	away/down	-	+	.1
4	own hand	=	=	NS
<u>B. Communicative Effort</u>				
24	Tonguing	+	-	.05
25	Wide-open-shaped mouth	+	-	.01
26	Mouth relaxed	=	=	NS
26a	Closed mouth	-	+	.05
<u>C. Affect</u>				
<u>Positive</u>				
14a	L palm open	=	=	NS
23a	R palm open	=	=	NS
34	Eyebrows raised	+	-	.05
35b	Eyebrows relaxed	=	=	NS
36	Smile	+	-	.05
37	Head up	=	=	NS
<u>Negative</u>				
9	(i) distress: L arm thrash	=	=	NS
18	R arm thrash	=	=	NS
32	Crying			NE
35	Frown	-	+	.05
35a	Raised frown	+	-	.1
<u>(ii) displacement:</u>				
10	L hand touch clothes	=	=	NS
19	R hand touch clothes	-	+	.1
11	L hand touch face	-	+	.01
20	R hand touch face	=	=	NS
28	Grimace	-	+	.001
30	Pout	-	+	.01
27	Chew	=	=	NS
29	Bite lower lip	-	+	.05
31	Yawn	-	+	.05
33	Suck thumb	=	=	NS
<u>D. Activity</u>				
6	L arm below shoulder	=	=	NS
15	R arm below shoulder	=	=	NS
7	L arm above shoulder	=	=	NS
16	R arm above shoulder	+	-	.05
7a	L arm down at side	=	=	NS
16a	R arm down at side	=	=	NS
8a	L arm beyond body	=	=	NS
17a	R arm beyond body	=	=	NS

short and fleeting (67.6% of looks), whereas only 20.3% are long, continuous gazes.

4. Act combinations

The data for this experiment was treated in the same way as that for the Blank-Face and Interruption study: each combination of acts that occurred in the $\frac{1}{2}$ second time intervals being allotted a number, and described in terms of a 4 figure code, compiled as outlined on pp. 101-2 and Appendix I. The twenty most common combinations in both the Normal and Unco-ordinated conditions were taken, summing scores for the four sessions (37 combinations in all). The distribution of each of these across these two conditions was compared to that which would have obtained by chance, using the X^2 test of 'goodness of fit'. It appeared, both from viewing the films and from the data on individual acts, that all four sessions yielded a similar pattern of results, and therefore the assumption of homogeneity within the sample, necessary for this test to be applied, was considered valid.

Results

As in the previous study, it is found that almost all of these combinations are significantly differently distributed across the Normal and perturbed conditions. The final 36 combinations, their codes and significance levels at 1 d.f. for the X^2 test (with Yates' correction applied for small numbers), are shown in Table 5.III with separate columns according to whether the profiles predominated in the Normal or Unco-ordinated conditions. The proportions of both condition times occupied by each combination are also shown.

As was pointed out when considering the action profiles typically occurring in the Blank-Face and Interruption study, these results in one sense merely replicate those for the distributions of individual acts:

TABLE 5.III

Table showing relative distribution of common act combinations across Normal and Unco-ordinated conditions for Munich group

Those predominating in Normal					Those predominating in Unco-ordinated				
Comb. No	Normal	Unco-ordinated	Code	χ^2 Sig. Level	Comb. No	Normal	Unco-ordinated	Code	χ^2 Sig. Level
1	11.9	1.6	0	.001	10	0	4.9	2	.001
2	7.7	0.7	0	.001	12	0	4.4	2	.001
3	7.3	0.4	0	.001	13	0	4.1	2	.001
4	7.2	1.5	0	.001	15	0	2.4	3	.001
5	4.8	0.1	0	.001	19	0	3.2	1	.001
6	4.5	2.5	0	.02	20	0	3.1	1	.001
7	8.4	0.1	0	.001	23	0	2.6	2	.001
8	3.1	1.2	0	.01	24	0	2.0	3	.001
9	5.5	0.3	0	.001	27	0.1	1.9	3	.01
11	3.9	0.7	0	.001	28	0	2.0	2	.001
14	4.3	0	0	.001	29	0	2.0	2	.001
16	3.5	0.4	0	.001	31	0	1.9	3	.001
17	4.5	0	0	.001	33	0.1	1.8	2	.001
21	2.1	0	0	.001	34	0	1.9	1	.001
25	1.6	0.1	0	.001	36	0	1.9	3	.001
26	1.9	0	0	.001	39	0	1.8	1	.001
32	2.4	0	0	.001	40	0	1.6	3	.001
53	1.6	0	0	.001					
55	1.3	0	0	.001					

mean = 1.8 2.1 5.5 0.8

mean = 0 3.5 6.6 2

thus, from the averaged scores for each item of the code (see bottom row of Table 5.III) it can be seen that:

- a) gaze to the mother predominates in the Normal condition;
- b) level of affect is higher (3.5 vs. 2.1);
- c) activity level is slightly higher (6.6 vs. 5.5), and
- d) communicative effort is considerably greater (2 vs. 0.8).

Nevertheless, as noted before (p.102), this method of analysis has the advantage of conveying the feel of the babies' activity in a more coherent, intuitively meaningful way when the codes are considered as whole profiles, and it also permits examination of any patterning in the interrelationships between the different variables represented in the code. The outcome of this kind of analysis, while only suggestive for the first Experiment, is, unfortunately, less clear in this study, with very little in the way of strong patterns of relationship emerging between the different variables. This disappointing result may be due to the fact that a much smaller sample of data was involved. The outcomes are briefly outlined below.

a) Relationship between quality of affect and degree of activity in Normal and Unco-ordinated conditions

The pairs of variables affect and activity, taken from the two sets of combinations which significantly differentiate Normal and Unco-ordinated conditions were plotted on co-ordinates of affect and activity as shown in Figure 5.VI. Unlike the spread obtained for the Normal condition in the first main study (Figure 4.II), where there appeared to be the possibility of a negative correlation between these two variables, no such relationship seems to obtain here; the generally positive quality of affect (range 3-4), appears to be randomly distributed with respect to the moderate-to-high levels of activity which occur.

In the Unco-ordinated condition it seems possible that there is a slight negative relationship between the level of affect and degree of

activity; the affect range is generally lower than that obtaining in the Normal condition (range 1-3), with levels 1 and 2 predominantly coinciding with levels 6 and 7 on the activity scale, whereas level 3 on affect co-occurs more with lower rates of activity.

b) Relationship between Force of Utterance and Level of Activity

As for the first pair of variables considered above, no relationship appears to hold between the Force of Utterance and the level of the baby's activity in the Normal condition. The range of communicative effort is from levels 1 to 3, and is distributed more or less equally across levels 5 to 8 on the activity scale. Similarly, in the Unco-ordinated condition, there seems to be no significant relationship between these 2 variables, with the Force of Utterance, varying from 0-2, spread across activity levels 4 to 7. (See Fig. 5.VII).

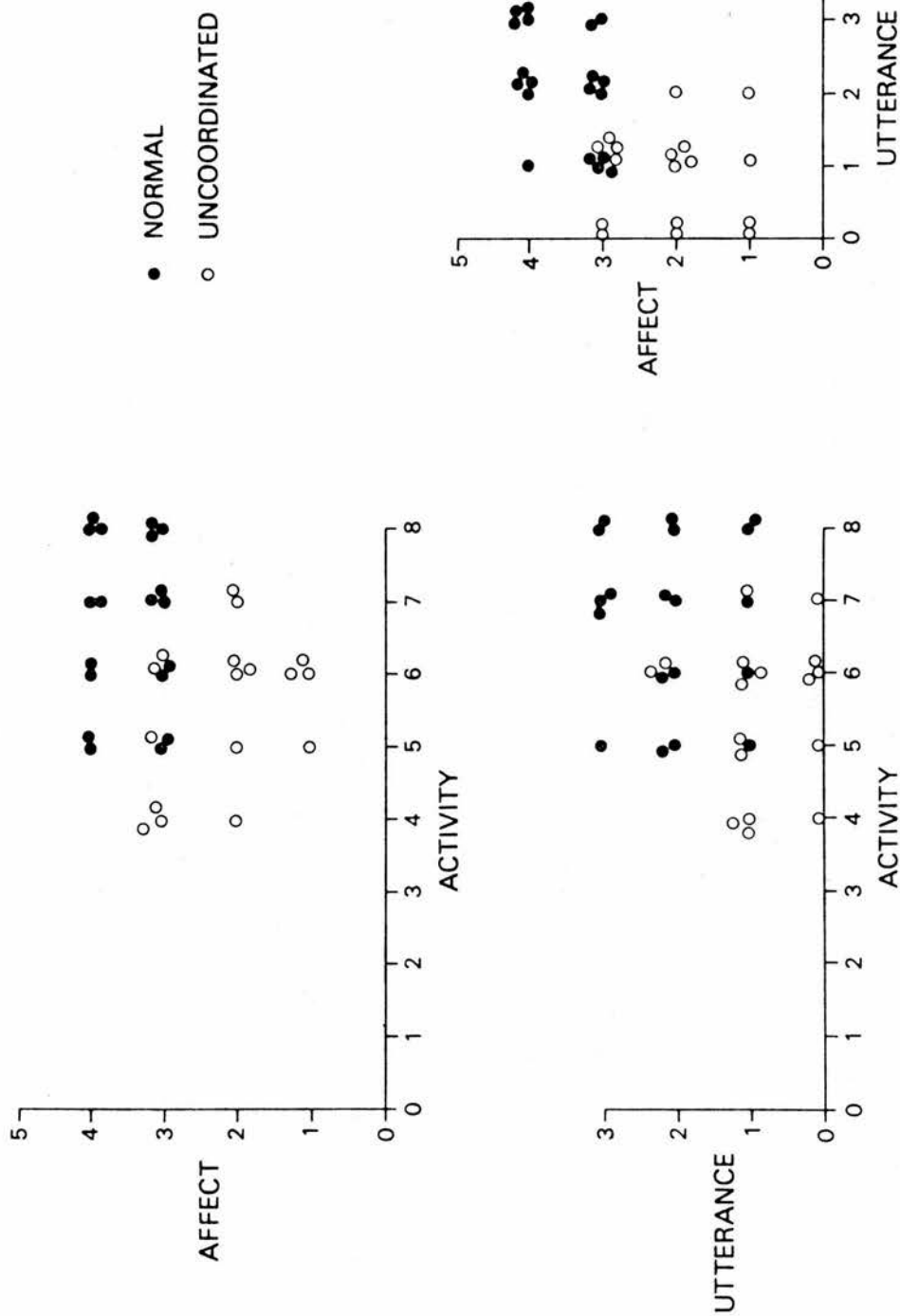
c) Relationship between Quality of Affect and Force of Utterance

As in the Normal condition of the previous main study (see Fig 4.IV above), a positive correlation is suggested by the distribution of scores on these 2 parameters in the Normal condition here, with level 3 on the Force of Utterance scale tending to co-occur with level 4 on Affect, whereas level 1 Force of Utterance co-occurs to a greater extent with level 3 on the Affect scale.

In the Unco-ordinated condition on the other hand, some slight negative correlation is possible, with level 2 on utterance co-occurring with levels 1 - 2 on affect, and level 1 on the utterance scale predominantly co-occurring with levels 2 - 3 on affect. This suggests that the communicative effort expressed in these two situations may be qualitatively different in terms of the affect which accompanies them. (See Fig. 5.VIII).

5. Gaze and other behaviours

Too little variation in the direction of gaze occurred within the



FIGURES 5 VI, VII, VIII

Figures showing relationship between pairs of variables in action profiles typical of each condition for Munich study.

common act combinations for each condition to permit any analysis of relationships with other acts on the basis of this form of data.

However, it is possible to some extent to replicate the analysis which was done in the main study above (pp. 106, 106a) on the co-occurrence of direction of gaze to and away from the mother with expressions of affect and utterance although the same statistical analysis is not appropriate since the number of sessions required for an application of the binominal sign test did not obtain.

Nevertheless, as was described above, p. 107, one can calculate for each condition in each session whether the degree of co-occurrence of gaze to or away from the mother with the different expressions of affect and communicative effort exceeds that which would be expected were the two variables quite independent. The results of carrying out this procedure are shown in Table 5.IV for acts where the observed level of co-occurrence exceeded the expected level in at least three out of the four sessions.

Although no firm statements can be made on the basis of these results as the number of sessions is so small, it appears that the pattern obtaining in the Normal condition here resembles that for the Normal condition in Experiments I & II (see p. 108 and Table 4.XI), with efforts to communicate, and expression of positive affect as indicated by raised brows, each occurring along with gaze to the mother more often than expected in three out of four cases, and relaxed brows co-occurring to the same degree with looking away from mother.

However, in the Unco-ordinated condition here, a different pattern is seen from that which occurs in the Blank-Face situation. Communicative acts (wide-open-shaped mouth postures) and expressions of positive affect do not accompany looking to the mother here, whereas they did so in the Blank-Face condition. On the other hand, grimacing and frowning (as well as the more usual mouth + eyebrows relaxed postures) co-occur here

TABLE 5.IV

Co-occurrences of units of looking to and away from the mother
with communicative and emotionally expressive acts
for Munich study

<u>Normal condition</u>			<u>Unco-ordinated condition</u>		
Acts co-occurring with looking ^{O E E O} to mother			Acts co-occurring with looking ^{O E E O} to mother		
Tonguing	3	1			
Wide-open-shaped mouth	3	1			
Eyebrows raised	3	1			
<u>Acts co-occurring with looking away</u>			<u>Acts co-occurring with looking away</u>		
Relaxed brows	3	1	Mouth relaxed	3	1
			Grimace	3	1
			Frown	3	1
			Eyebrows relaxed	3	1

with looking away from the mother more than expected, each in 3 out of 4 sessions, whereas in the Blank-Face condition such acts were significantly related to looking to the mother.

DISCUSSION

Before going on to give a general outline of the infants' reactions to the Normal and Unco-ordinated conditions here, and to consider the significance of the results, the behaviour of the mothers in the Unco-ordinated condition should be mentioned.

As stated above, and in the introduction to the previous pilot study, it was intended to create a situation which would test whether the baby is sensitive purely to the timing of the partner's acts in relation to his own, and, moreover, is motivated to establish and maintain this kind of reciprocal relationship. The first pilot study failed to test this adequately since the partner's behaviour altered in style during the intended Unco-ordinated condition, and for this reason the study here was

designed. From initial observation, both of the sessions as they took place, and of the films, it appeared that this pilot study had been more successful in eliciting natural and consistent behaviour in the partner in the Unco-ordinated condition. However, closer scrutiny made it apparent that slight shifts in the mother's posture occurred during this perturbatory condition, and, probably more importantly, the mother of course lost eye-to-eye contact with her baby, as she raised her eyes to view the film. (Later analysis of mothers' baby talk in an even more controlled Unco-ordinated condition also revealed subtle changes in the content of her speech - see Chap 7, pp.184-90- which, it seems likely, would also have been provoked here.)

These factors mean that although the initial design was improved, the stylistic changes that did occur do not permit one to infer that the baby's reactions were purely due to the effects of the temporal relations being disrupted between his own and his mother's activity. Nevertheless, it was considered that the analysis of the data conducted above was worthwhile, since the study still provided evidence of the baby's sensitivity and adaptive capacities in the face of these slight variations in the mother's behaviour.

Summary of the babies' reactions to the Normal and Unco-ordinated conditions

As was mentioned above, the pattern of behaviour occurring in the Normal condition here closely matches that obtained in the Normal condition of the Blank-Face and Interruption study, and further supports the reliability of such descriptions. The baby watches his mother's face almost all the time, appearing both actively communicative, with a considerable amount of tonguing ($X = 60\%$), and wide-open-shaped mouth postures ($X = 32.2\%$), and contented, with frequent smiles and mostly relaxed or raised brows. Each occurrence of these acts and expressions,

except relaxed brows, is, on average, longer in duration than in the Unco-ordinated condition, and they generally happen whilst the baby is looking at his mother. There may, furthermore, and as in the first study, be a tendency for communicative and emotionally expressive acts to be organized together in time, with expressions of positive affect going along with more active communicative efforts.

In the Unco-ordinated condition on the other hand, attention to the mother's face drops (from $X = 84.5\%$ to $X = 33.8\%$), with the baby either looking away, or at his own hand. The signs of positive affect seen in the Normal condition are no longer elicited, and instead multiple indications of distress or conflict are seen, e.g. touching the clothes or face, yawning, biting the lower lip, pouting and grimacing. Any expressions of positive affect and attention become more fleeting, whereas the more negative expressions tend to be more prolonged than in the Normal condition.

In these respects the profile of behaviour resembles that provoked in the Blank-Face condition. However, several interesting differences also occur. In the Blank-Face condition the baby's level of communicative effort was maintained; this, and the data from the action profiles and on significant co-occurrences with gaze to the mother, suggest an interpretation in terms of the infant's soliciting his mother's active attention, or protesting at her unresponsive behaviour. In the Unco-ordinated condition here, however, and in the previous pilot study, the level of communicative effort falls, and in this study the baby becomes more self-absorbed in terms of the amount of hand regard, than during the Blank-Face condition ($X = 14\%$ vs. $X = 1.3\%$). Furthermore, rather than negative emotional expressions tending to accompany looks to the mother's face, as was the case in the Blank-Face situation, in this condition they seem to occur whilst the baby looks away from her. The

baby's attitude suggests more a mood of rather unhappy puzzlement at the mother's odd and incomprehensible behaviour than protest, although the slightly depressed and withdrawn phases are common to both situations.

The behaviour profile provoked in this situation is, it should be noted, also quite different from that elicited during the Interruption, where it is remembered, the baby, although similarly making few communicative efforts, seemed to show no such signs of distress and withdrawal as are found here, but rather an appreciative, if quiet and unexcited, interest.

These differences in the babies' reactions to the various forms of interpersonal contact further lend support to the view that, at least by six weeks, infants seem to possess fine discrimination of different modes of personal conduct, and to have a varied and complex repertoire of adaptive reactions. In order to be more confident of the pattern provoked in the perturbatory procedure here, and so lend weight to these conclusions, it was decided to develop the Unco-ordinated condition further, and to conduct a more extensive study.

CHAPTER 6

EXPERIMENT EMPLOYING A DOUBLE-V.T.R. TECHNIQUE TO TEST THE EFFECTS
ON THE INFANT OF INAPPROPRIATE TIMING OF THE MOTHER'S BEHAVIOUR

INTRODUCTION

In view of the fact that in the two pilot studies above the mother's behaviour in the Unco-ordinated condition did not remain free of stylistic changes, it was decided to devise a situation which would permit examination of the effect on the baby of altering only the timing of the mother's activity in relation to his own, so that such changes in style could not influence the outcome.

THE DOUBLE V.T.R. TECHNIQUE

In order to achieve such a situation a double V.T.R. Technique was designed, in which essential features of face-to-face interactions are retained, while allowing for selective, manipulation in time of the presentation of one partner's communications to the other. The situation is achieved as outlined below, and is illustrated in Figure 6.1.

The mother and infant are seated in separate rooms. Each sits directly in front of a box blackened on the inside: at the back of the box a camera lens is inserted in a hole the diameter of the lens. The lens is invisible to the subject, and films the subject's head and shoulders, full-face. At the front of the box there is a sheet of glass at 45° to the horizontal which reflects the image of the other partner (who is in the same situation in an adjacent room) to the subject from a videomonitor suspended face-down above the glass. This method in fact results in the images seen by each subject being L/R rotated, a feature which is in fact easily corrected with the use of another mirror. Although the effects of the reversal obtaining here on the perception of communicative expressions and processes are not known, this technical detail does not effect the interpretations made

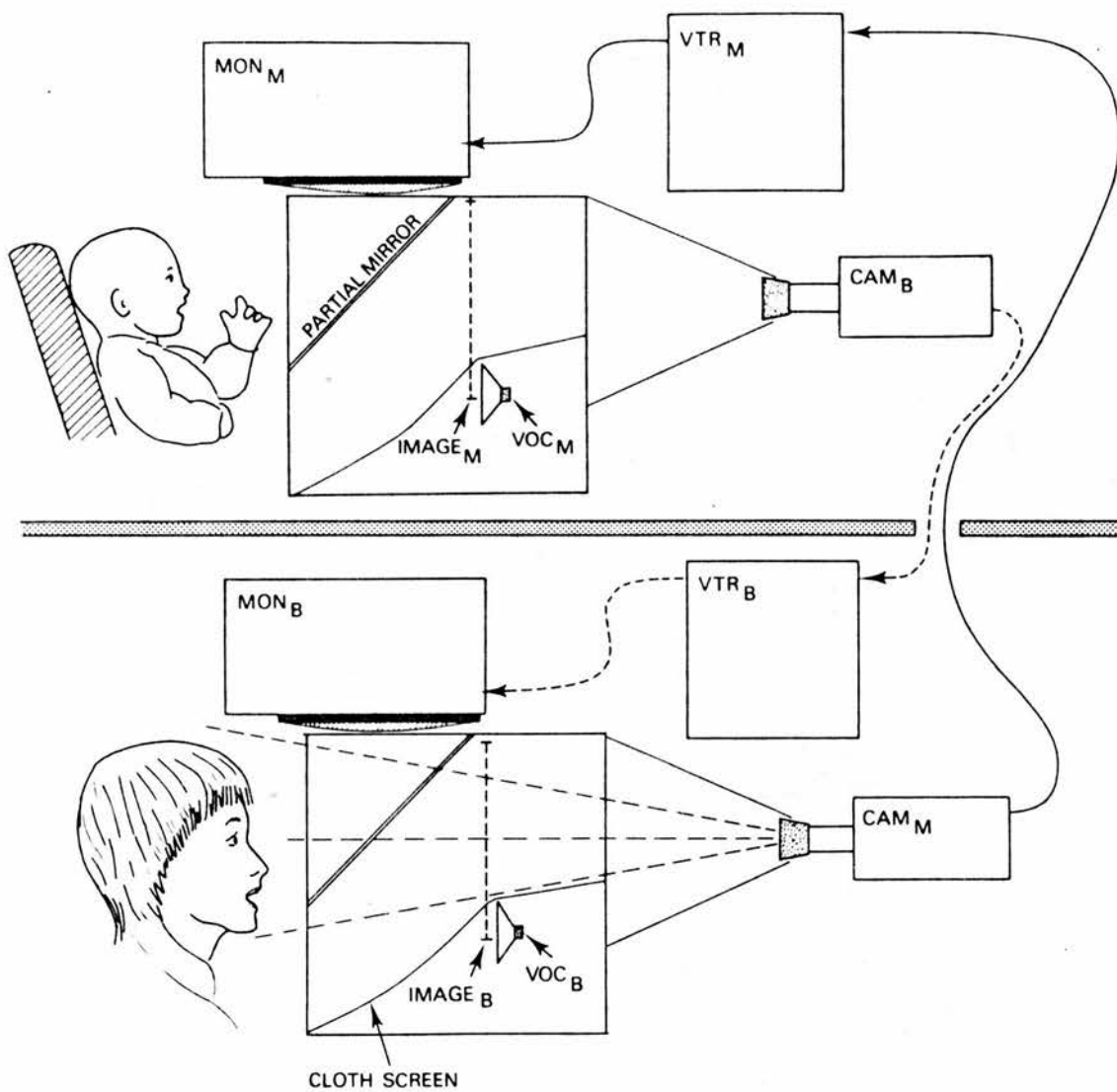


FIGURE 6, I

here, since it applied across conditions. The two partners see each other full-face and life-size, with perfect eye-to-eye contact being possible. The images of the two partners are relayed via video-recorders to the monitors, thus the timing of the display of one partner to the other can be varied from being shown in real time to each, thus permitting a genuine, two-way exchange, to one being delayed by any chosen interval relative to the other.

When one is in the double video situation and faced with the image of the partner on the monitor, the subjective impression of being able to communicate with the partner is immediate and vivid, and very realistic in spite of cues such as touch and smell being absent, and is of course even more enhanced when a colour television system is used.

As well as the contribution to theoretical issues the development of the technique represents, permitting as it does the timing of interactions alone to be controlled, without disruption to the form, this technique also has the advantage of supplying full-face video recordings of each subject in the interaction which can be retained and used for precise and detailed analysis of the facial expressions of emotion and communication, and of the pattern of eye-to-eye contact or avoidance, as well as of the interrelations between the two partners' acts. In this, the method represents a considerable advance in the development of a technology for accurate observations.

METHOD

Design of the experimental test

In order to assess the baby's sensitivity to the timing of the mother's interactive behaviour in relation to his own, without the complication of alterations in form, the mother and baby first interacted with each other in the double V.T.R. situation with the images of each other relayed live, thus allowing for a two-way exchange to take place

and for the mother's acts to be appropriately timed in relation to the baby's. Following this period of genuine interaction, the baby is presented with a replay of his mother's image. Here the form of the mother's activity is, of course, precisely the same as during the live interaction; the only, and crucial difference is that in the replay condition the mother's acts, since they are prerecorded, are no longer responsive and appropriately adjusted to the baby's ongoing activity. The behaviour of 4 babies^{between 6 and 12 weeks} was compared in these two situations.

As with the two pilot-studies above, it is suggested that if babies are sensitive to this dimension of the partner's behaviour, and are motivated to establish a relationship or interaction where each partner's acts are coordinated with those of the other, then the Replay condition should provoke systematic differences in the baby's behaviour entailing indications of protest or distress.

Subjects

Criteria and procedures for recruitment were the same as for Experiment I. Subjects were four babies, 2 boys and 2 girls, and their mothers. Each was seen at approximately 1 week intervals between six and twelve weeks. Five complete sessions were recorded for three babies, but one baby cried throughout two sessions, and therefore only three were recorded successfully for him.

Apparatus

The subjects were positioned as described in the outline of the double V.T.R. Technique above. An additional mirror was placed next to the baby, in which the image that the baby was viewing of the mother was reflected. A cine camera was placed to film both the reflection of the mother in the mirror, and the baby, as near as possible to full face. Although, as noted above, the video-tapes themselves offered ideal full-face data for detailed analysis of expressions, cine film was

again used here to permit frame by frame analysis with the "perceptoscope", and to include analysis of limb postures and activity.

Procedure

The procedures carried out prior to the running of the experimental sessions (transport, preparation of subjects, etc.) were the same as those for Experiment I (pp. 65, 66).

The baby, when ready, was strapped and settled into the infant chair in front of the inclined reflecting glass where the image of his mother would shortly be seen. An experimenter then chatted to him whilst his mother went through to the adjoining room and positioned herself in front of the reflected image of her baby. She then attracted her baby's attention, and checks were made that eye-to-eye contact was successfully established, and that the baby seemed happy to attend to and interact with his mother in this way. Once this was ascertained the recording of the baby in the first condition - Normal interaction - began.

The baby was filmed with 50' Tri x reversal film with the Bolex cine camera run at 12 frames per second for approximately 1 minute. There was then a pause during which the baby was distracted by the experimenter and the videotape recording of the mother in the preceding Normal condition was rewound in preparation for the Replay condition. The baby was then shown the replay of the film of his mother which he had just seen in live time, and his behaviour during this 1 minute presentation was similarly recorded on the cine film. A further live condition was finally run and filmed for $\frac{1}{2}$ minute.

Data and Analysis

The film of the baby was scored in the same manner as for the previous experiments, the view of the mother being obscured throughout. The babies' behaviour in the 2 conditions Normal and Replay was compared using the same types of description as in the other studies, i.e.:

- 1) the overall frequency of occurrence of each act;
- 2) the average duration of each act;
- 3) the length of gaze bouts;
- 4) common act combinations;
- 5) co-occurrences of emotional expressions and communicative acts with the direction of gaze.

RESULTS

1. Distribution of acts in terms of overall frequency of occurrence across Normal and Replay conditions

The results of t-tests performed on the overall frequencies of occurrence of each act in the two conditions, for all subjects and sessions, are shown in Table 6.I, with significance levels applied according to the predictions outlined for the Blank-Face experiment - see Table 4.II, 30 acts occurred, and of these, 22 differed in their frequency of occurrence across the two conditions, (although in 6 cases this was only a trend). Generally, attention to the mother, communicative efforts and expressions of positive affect fell during the Replay condition, whilst negative emotional expressions and displacement activities increased in frequency; limb activity and posture on the other hand tended not to change, but those that did - both arms going above shoulder level, and the right arm extending beyond the body, which all occurred more in the Normal condition, may reflect a greater level of excitement and activity in this condition. These results generally follow the same pattern as those obtained in the pilot study (b) above and, apart from the drop in communicative effort and less active limb movements in the perturbatory period here, replicate the differences found between Blank-Face and Normal conditions in Experiment I.

2. Differences in average act lengths between Normal and Replay conditions

The results of t-tests performed on the average duration of each act by subject and session, in the Normal vs. Replay conditions, are

TABLE 6.I

Table of t-test results showing the differential distribution of acts across Normal vs. Replay conditions in the Double V.T.R. experiment in terms of overall frequencies

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Replay</u>	<u>Sig. Level</u>
A. <u>Attention</u>				
1	to mother	+	-	.0005 lt.
3	Away from mother	-	+	.0005 lt.
4	own hand	=	=	NS
B. <u>Communicative Effort</u>				
24	Tonguing	+	-	.05 2 t
25	Wide-open-shaped mouth	+	-	.001 2t
26	Mouth relaxed	+	-	.05 lt.
26a	Mouth closed	-	+	.0005 lt.
C. <u>Affect</u>				
<u>Positive</u>				
14a	L palm open	+	-	.1 lt.
23a	R palm open	=	=	NS
34	Eyebrows raised	+	-	.0005 lt.
35b	Eyebrows relaxed	+	-	.1 lt.
36	Smile	+	-	.05 lt.
37	Head up	=	=	NS
<u>Negative</u>				
9	(i) distressed: L arm thrash			NE
18	R arm thrash			NE
32	Crying			NE
35	Frown	-	+	.0005 lt.
35a	Raised Frown	-	+	.01 lt.
(ii) displacement:				
10	L hand touch clothes	-	+	.05 lt.
19	R hand touch clothes	-	+	.0005 lt.
11	L hand touch face	=	=	NS
20	R hand touch face	-	+	.1 lt.
28	Grimace	-	+	.0005 lt.
30	Pout			NE
27	Chew			NE
29	Bite lower lip	-	+	.05 lt.
31	Yawn	-	+	.05 lt.
33	Suck thumb			NE
D. <u>Activity</u>				
6	L arm below shoulder	=	=	NS
15	R arm below shoulder	=	=	NS
7	L arm above shoulder	+	-	.1 2t.
16	R arm above shoulder	+	-	.1 2 t.
7a	L arm at side	-	+	.1 2 t.
16a	R arm at side	=	=	NS
8a	L arm beyond body	=	=	NS
17a	R arm beyond body	+	-	.01 2 t.

lt = 1 tailed test

shown in Table 6.II. Of the 30 acts 15 change significantly in this way, (although in 4 cases this is only a trend) and, as with the results of the previous experiments, it can be seen that the pattern of change here is similar to that for overall frequency differences for acts of attention, communicative efforts and affect. This suggests that the overall frequency differences for these acts are at least partially due to these acts altering in the duration of their individual occurrences, i.e. to a change in form, rather than to their occurring in the same form in the two conditions, but with a very low incidence in one. On the other hand, displacement activities such as handling the clothes, touching the face and yawning, where the overall frequency increased in the Replay condition, do not change in their average duration, indicating that their incidence of occurrence changes, rather than the durations of form of the acts. This possible differentiation between displacement activities and negative expressions, the former appearing more stereotyped in duration, seems far less clear in the other experiments and would have to be confirmed, and its significance examined further with more subjects and sessions.

3. Gaze bouts

As for the other experiments, looking in the two conditions was sorted into three categories of length, and the proportions of the total number of gazes in each condition represented by these 3 categories are shown in Figure 6.II. The same patterns of distribution can be seen to occur here between the two conditions Normal and Replay as were found between the Normal and Perturbatory conditions in the other experiments, with most gazes to the mother's face in the Normal condition being looks of over 5 seconds duration (76.9%), very few looks are of intermediate length (7.7%) and there is a fairly low proportion of short glances (15.2%). In the Replay condition, on the other hand, the majority are

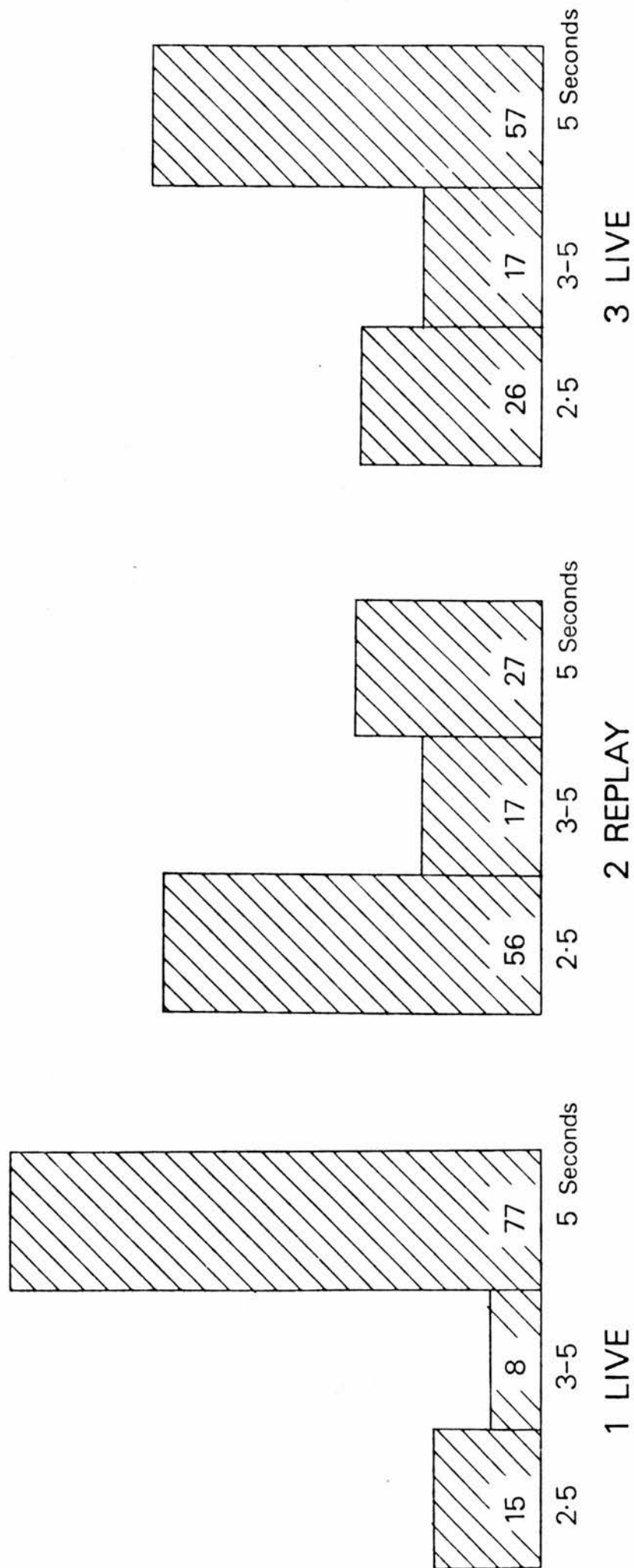


FIGURE 6 II

Frequency histogram for gaze lengths as in Figure 4 I. Double V.T.R. experiment, showing shorter looks in Replay.

TABLE 6.II

Table of t-test results showing the differential distribution of acts across Normal and Replay conditions in the Double V.T.R. experiment in terms of average act lengths

<u>Act No.</u>	<u>Act</u>	<u>Normal</u>	<u>Replay</u>	<u>Sig. Level</u>
<u>A. Attention</u>				
1	to mother	+	-	.001 2 t.
3	away from mother	-	+	.1 2 t.
4	own hand	=	=	NS
<u>B. Communicative Effort</u>				
24	Tonguing	+	-	.01 2 t.
25	Wide-open-shaped mouth	+	-	.01 2 t.
26	Mouth relaxed	=	=	NS
26a	Mouth closed	=	=	NS
<u>C. Affect</u>				
<u>Positive</u>				
14a	L palm open	+	-	.05 2 t.
23a	R palm open	+	-	.02 2 t.
34	Eyebrows raised	+	-	.01 2 t.
35b	Eyebrows relaxed	+	-	.1 2 t.
36	Smile	+	-	.1 2 t.
37	Head up	*	=	NS
<u>Negative</u>				
9	(i) distressed: L arm thrash			NE
18	R arm thrash			NE
32	Crying			NE
35	Frown	-	+	.001 2 t.
35a	Raised frown	=	=	NS
<u>(ii) displacement:</u>				
10	L hand touch clothes	=	=	NS
19	R hand touch clothes	=	=	NS
11	L hand touch face	=	=	NS
20	R hand touch face	=	=	NS
28	Grimace	-	+	.001 2 t.
30	Pout			NE
27	Chew			NE
29	Bite lower lip	-	+	.1 2 t.
31	Yawn	=	=	NS
33	Suck thumb			NE
<u>D. Activity</u>				
6	L arm below shoulder	=	=	NS
15	R arm below shoulder	=	=	NS
7	L arm above shoulder	+	-	.01 2 t.
16	R arm above shoulder	+	-	.05 2 t.
7a	L arm at side	=	=	NS
16a	R arm at side	=	=	NS
8a	L arm beyond body	=	=	NS
17a	R arm beyond body	+	-	.02 2 t.

2.t. = 2tailed test.

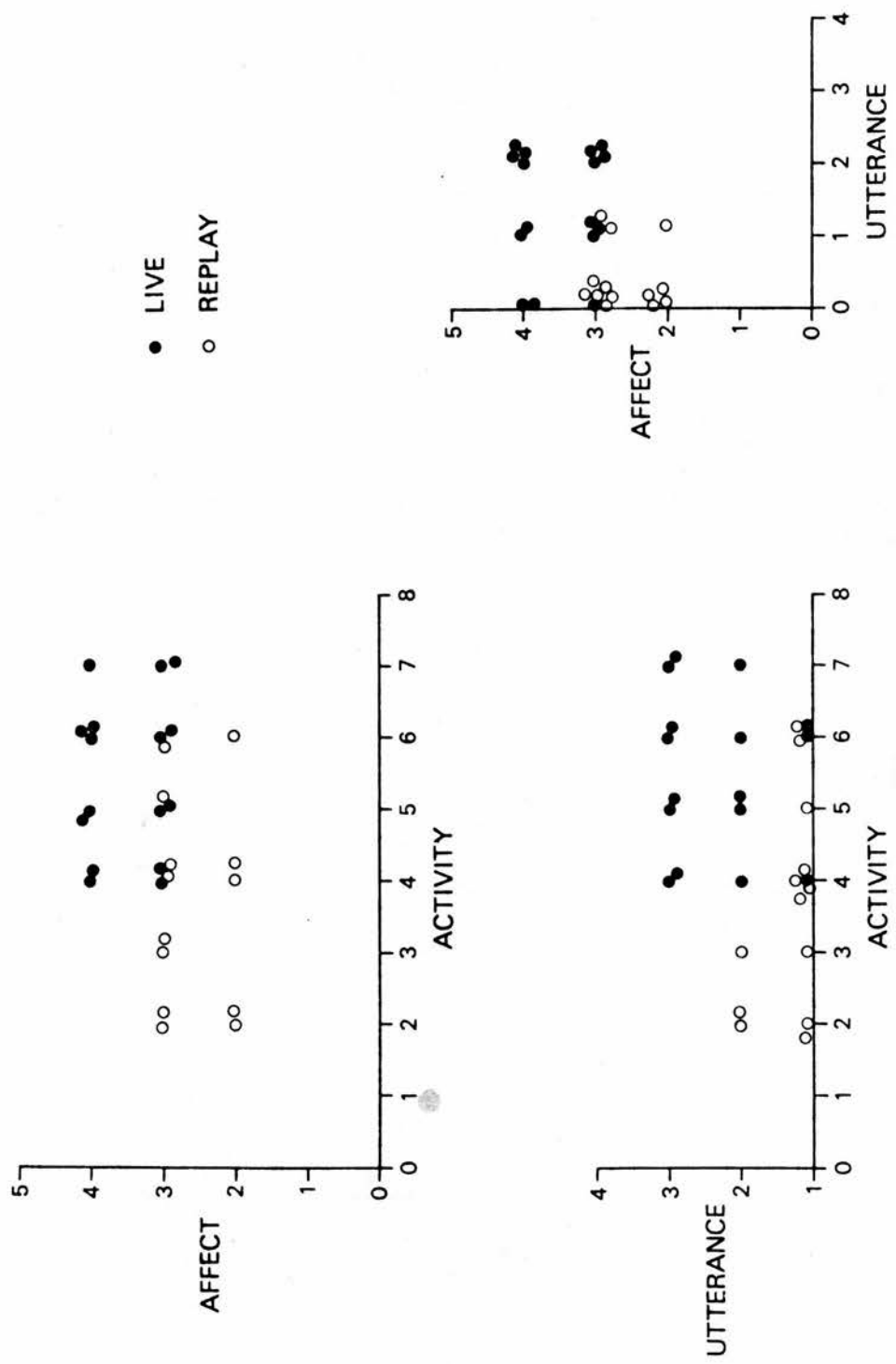
short glances (55.5%), and only 27.3% are long, continuous looks.

4. Act combinations

The 20 most common act combinations in each condition, Normal and Replay, were taken (32 in all) and again, since all babies seemed to have shown similar patterns of behaviour, their frequency of occurrence in each condition was compared to that which would have occurred by chance (χ^2 test of goodness of fit). The 29 combinations which significantly differed from this chance distribution, along with the levels of significance, relative incidence of occurrence in each condition, and codes, are shown in Table 6.III. 10 of the 16 combinations which predominated in the Normal condition here had also done so in the Normal conditions of Experiment I and the pilot study (b), and 6 of the 13 combinations which predominated in the Replay condition here had also predominated in the Blank-Face or Unco-ordinated condition in the other experiments. These combinations are asterisked.

The averaged scores for each element of the code indicate, as do the results for the other three methods of analysis above, the fall in amount of gaze to the mother, communicative efforts, positive affect and activity in the Replay condition.

The scores for the elements which make up the combination codes are plotted in pairs in Figures 6.III- VI, with gaze shown only for the Replay condition, as no variation occurred in the Normal. Unfortunately, and as in the pilot study (b) above, this treatment of the data fails on the whole to bring out any clear pattern of organization in the babies' acts, certainly for the pairs 6.III 'Affect' plus 'Activity', and 6.V 'Affect' plus 'Utterance'. This may be because the interactive behaviour of the baby in the Double V.T.R. situation, although showing all the usual characteristics seen in real face-to-face encounters such as tonguing, wide-open-shaped mouth postures, gesturing of the arms,



FIGURES 6 III, IV, V

Figures showing relationships between pairs of variables in action profiles typical of each condition for Double V.T.R. experiment.

TABLE 6.III

Table showing relative distribution of common act combinations across Normal and Replay conditions in the Double V.T.R. experiment

Those predominating in Normal					Those predominating in Replay					χ^2 Sig. Level
Comb. No.	Normal	Replay	Code	χ^2 Sig. Level	Comb. No.	Normal	Replay	Code	χ^2 Sig. Level	
2	5.06	3.19	0 3 6	.01	1	4.27	5.77	0 3 4	0 Σ .05	
5	3.75	1.29	0 3 6	.001	17	0.98	3.42	0 3 3	0 0 .001	
6	6.33	0.87	0 4 6	.001	18	1.08	2.70	2 3 6	0 0 .001	
7	5.11	0.91	0 4 6	.001	21	0.38	3.15	2 3 4	0 Σ .001	
8	4.59	1.86	0 3 4	.001	22	1.17	3.32	0 3 3	1 1 .01	
9	2.48	1.59	0 3 5	.05	24	0.42	2.25	2 3 5	0 Σ .001	
11	1.88	0.95	0 3 5	.01	28	0.52	1.82	0 3 2	1 1 .001	
12	4.22	1.10	0 4 6	.001	29	0	2.28	0 2 2	0 0 .001	
13	2.16	0.95	0 4 7	.001	32	0.05	1.97	0 2 4	0 0 .001	
14	2.48	0.99	0 4 5	.001	34	0	2.09	2 2 6	0 0 .001	
15	2.91	0	0 4 5	.001	36	0.05	1.78	2 3 2	0 Σ .001	
16	2.25	1.1	0 3 4	.001	43	0	1.37	2 2 4	0 0 .001	
19	3.0	0.68	0 4 4	.001	45	0	1.44	0 2 2	1 1 .001	
20	2.20	0.84	0 3 7	.001						
23	2.16	0.61	0 3 7	.001						
27	1.88	0.68	0 4 4	.001						

mean = 0 3.6 6 1.3

mean = 0.9 2.6 3.8 0.2

nevertheless seems to lack the usually generated qualities of enthusiasm and warmth. This alteration in the quality of affect may, then, be responsible for the patterns of relationship suggested in the previous studies between affect and the other variables failing to obtain here.

(c) 'Utterance' and 'Activity'

In the case of the relationship between 'Utterance' and 'Activity' levels, whereas no pattern is apparent between the two variables in the Normal condition, in the Replay there is possibly some slight negative correlation: all occasions where communicative efforts are made are accompanied by a low level of activity, whilst in 7/10 cases where there is no communicative effort, the activity level is higher. See Fig. 6.IV.

(d) Gaze with other variables in the Replay condition

(i) 'Communicative Efforts and 'Gaze'

As in the Blank-Face condition, it is found that when efforts at communication occur they always do so when the baby is looking at the mother. See Fig. 6.VI(a).

(ii) 'Affect' and 'Gaze'

These two variables seem to show no strong pattern of relationship in this condition. See Fig. 6.VI(b).

(iii) 'Activity' and 'Gaze'

The distribution of these two variables seems to suggest that the baby is more active when looking away from his mother. See Fig. 6.VI(c).

5. Overall Co-occurrence of Gaze direction with Affect and Communicative Effort in the two conditions

As for Experiment I, and the second pilot study above, the degree of co-occurrence within the $\frac{1}{2}$ second time blocks of the direction of gaze with affective expressions and communicative acts was estimated for each subject and session, and the outcomes compared to those expected were the

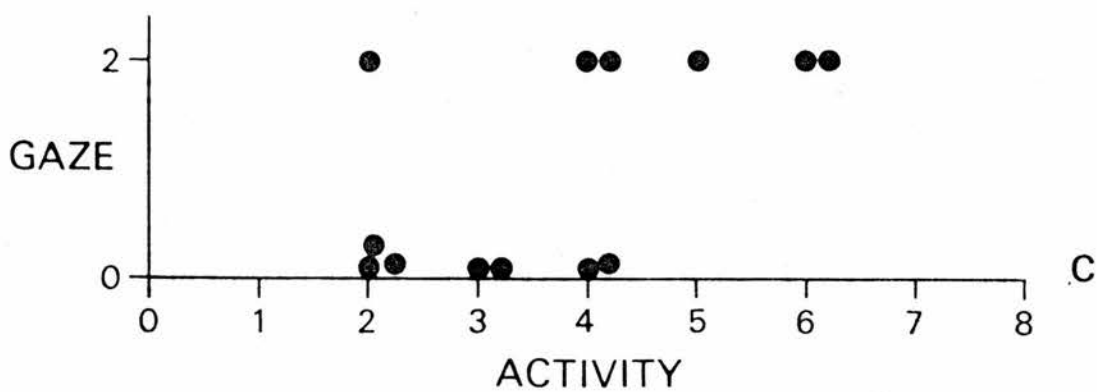
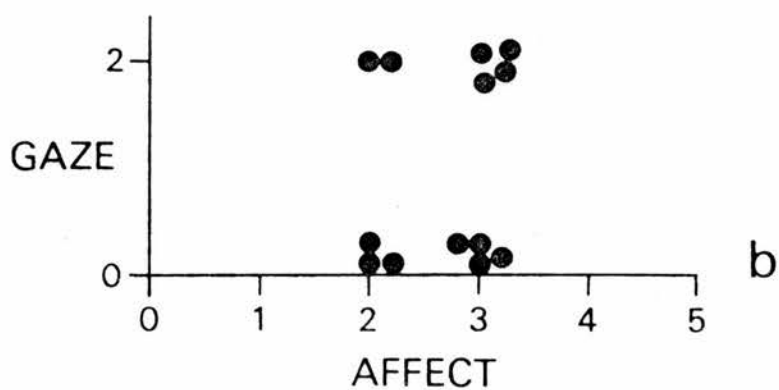
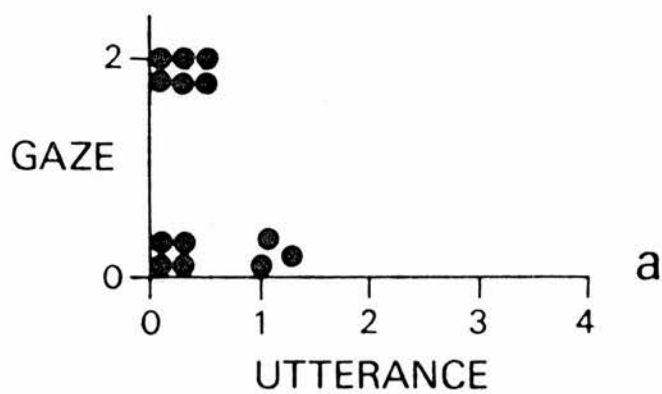


FIGURE 6VI

Relationship between gaze and other variables in Replay condition.

acts to occur independently of each other. The number of times the observed exceeded the expected values was then rated for significance, using the binomial sign test (see p.107, for details of this procedure). Those acts which showed a significant degree of co-occurrence with the direction of gaze are shown in Table 6.IV.

The pattern of co-occurrences in the Normal condition here resembles that obtained in the other Normal conditions, with expressions of positive affect and efforts to communicate coupled with looking at the mother, whereas less active and more neutral expressions accompany looking away. In the Replay condition this pattern is maintained for expressions of positive affect, as it was in the Blank-Face condition, with smiling and raised brows, although infrequent, happening whilst the baby looks at his mother. Unlike the Blank-Face condition, but as was found, however, in the Unco-ordinated condition of pilot study (b) above, communicative efforts are not found to accompany looking at the mother to any significant degree (contrary to the suggestion based on the act combination data above), and expressions of negative affect (mouth closed, and frowning) accompany looking away.

TABLE 6.IV

Co-occurrence of units of looking to and away from the mother with
communicative and emotionally expressive acts for the
Double V.T.R. Experiment

Acts co-occurring with looking to mother

<u>Normal</u>		<u>Replay</u>	
Tonguing	.01	smiling	.1
wide-open-shaped mouth	.004	eyebrows raised	.002
mouth relaxed	.1	eyebrows relaxed	.04
eyebrows raised	.006		
smiling	.03		

Acts co-occurring with looking away from mother

mouth closed	.1	mouth closed	.05
eyebrows relaxed	.09	eyebrows frown	.004
neutral expression	.03	neutral expression	.1

DISCUSSION

General picture of the baby's behaviour in these two conditions and comparison with results of the other experiments

In the Normal condition here, with communication taking place via televised images, one sees all the usual features of the baby's behaviour when in real face-to-face interaction with his mother, although the mood seems less exuberant and enthusiastic; thus, while communicative efforts and gaze show almost identical rates here and in the Normal condition of Experiment I, smiling is not so frequent. Nevertheless, as was pointed out (p.152), more than half the common action profiles which are typical of the Normal condition here also occurred in the other Normal conditions; these results indicate the success of this technique both in eliciting infants' interactive behaviour for full face observation, and in testing the baby's reactions to the timing of the mother's behaviour with respect to his own, without the contaminating effects of stylistic changes occurring. It was later found in a replication conducted with the C.O.I., that when a colour T.V. system is used, these slight differences in the amount of excited, happy behaviour disappear almost altogether, in spite of the uncorrected L/R inversion of the image. See Appendix II for illustrations.

Having shown, then, that all the usual features of infant communicative behaviour in face-to-face interactions occur in the Normal, live, condition here, the pattern of activity is seen to alter significantly during the Replay. In this condition the baby turns away from the image of his mother, looking puzzled and frowning, making more prolonged grimacing movements, touching his clothes and face and yawning more often. His looks towards the screen tend to be fleeting glances. Unlike the Blank-Face situation, the level of tonguing and wide-open-shape mouth postures and waving gestures of the arms is low, as though the attempts to communicate with the mother seen in the former situation

are not happening here. Rather, the baby looks briefly at the mother in a slightly bland, hesitant fashion (mouth and eyebrows relaxed) and with less active gestures, showing signs of being perturbed in the fingering of clothes and face and other displacement activities, as though altogether rather puzzled by his mother's behaviour. On occasions, there appears to be a chance coincidence between the mother's replayed acts and the infant's ongoing behaviour, for example, the baby glances to the screen just as the mother begins to smile and nod, and in such cases the infant in turn may smile and raise his brows, but he quickly looks away again and frowns as if disturbed at perceiving that the mother's continuing behaviour is no longer related to his response.

The fact that the timing of the mother's acts with respect to those of the baby is the only difference between the two conditions in the experiment here, and that the babies showed systematic differences in their behaviour in the face of these two presentations is confirmation of our hypothesis that babies of this age are highly sensitive to the temporal relationships between their own acts and those of the partner, as well as to the form which their mother presents. It should be noted that this further confirms the inadequacy of any simple or strict version of the discrepancy hypothesis to explain disturbances of affect and attention.

Not only is fine sensitivity demonstrated above, but the results also lend further evidence to support the view of the richness and complexity of organization of affective acts available to the young baby. For the pattern of behaviour elicited in the Replay condition here confirms the suggestion made tentatively on the basis of the pilot studies, that as well as having the capacity for organized acts of a form which suggests protest or solicitation, as was shown in the Blank-Face presentation; or ^{for} the quiet, undistressed interest shown in the Interruption condition, the baby's repertoire includes indications of

puzzlement as well as some distress. These distinctive, organized profiles, appearing appropriate to the different conditions, also suggest that the baby is not merely sensitive to parameters of the mother's behaviour which can be reduced to physical elements alone, but appears to perceive the form of the mother's acts in terms of affective states and communicative acts of interpersonal significance - i.e. a Blank-Face presentation as rather threatening but potentially responsive; 'Interrupted' behaviour as non-threatening, and interesting, but making communicative efforts as inappropriate; and Unco-ordinated behaviour as puzzling and odd. The fact of the differentiation between these situations, apparent in the baby's acts, gives strong support to Ethological and Psycho-analytic interpretations and especially to the theory of Intersubjectivity, all of which assume (see p. 60) that the infant is capable of perceiving intentions and affective structure in others' acts.

Although the results of this experiment taken in isolation might be seen to reinforce the view put forward by the contingency theorists - that the source of positive affect and attention is the baby's discovery of predictable relations between his own activity and events in the world which he can then come to control - the results of all these experiments taken together give the element of timing a different significance. Although contingent responsiveness is undoubtedly an important component of the interaction to which the infant is sensitive in regulating and perceiving how his own acts relate to those of his partner, as was concluded previously (p. 116) and as is reinforced by the form of the infant's acts here, this factor of contingency is alone not sufficient to account for the distinctive behaviour patterns shown by the infants in the face of the mother's different kinds of unresponsiveness in the various perturbations.

CONCLUSIONS

In having brought to light both a further dimension of the infants' sensitivity to the communicative behaviour of others, and another apparently consistent form of expressive and regulatory behaviour, the results of this experiment and of the pilot studies which led up to it, further substantiate the conclusions reached from the Blank-Face and Interruption study (see pp.108-118). Here, the adequacy of the different theoretical accounts of young infants' reactions to experimental perturbations involving some disruption to the interpersonal situation was discussed, and it was concluded that the explanations of Ethological, Psycho-analytic and Intersubjectivity theories were better able to encompass the findings than were Discrepancy and Contingency theories of affect and attention.

Furthermore, the implications^{that} the results carried for more general accounts of the emotional expressions and sensitivities of infants were considered, and the findings of these last experiments on the infant's responses to the mother's behaviour when unco-ordinated with the babies' own acts further reinforce the conclusions reached above (p. 111) on the complexity of expression and fine sensitivities of babies of at least six weeks.

In view of these conclusions, we have now to consider the significance they hold for descriptions of mother-infant interactions in particular, and more generally for theories of social development. In the Introduction it was pointed out that workers influenced by several different disciplines have considered the infant to be at first essentially asocial, and his role in early exchanges to be very limited; for example, this may be because he is thought of as a fundamentally cognitive being, with his understanding and perception of other people as such developing only through the effects of their ministrations and

attentions becoming harnessed in time with his own activity (Kay e, 1977; Schaffer, 1971, 1974, 1977; Papousek, 1975, 1977; Watson, 1972, 1977). Or else he is thought of as an essentially biological being (Richards, 1974a and b) with 'natural' rather than 'personal' powers (Shotter, 1974) who only becomes personal and social through internalising the interpretations others give to his actions.

It is argued that the data presented here lead one to a different conception of the young infant and his role in early exchanges; for the results imply that the infant is firstly a very sensitive partner, having specific expectations from early on about what constitutes acceptable and appropriate behaviour in other people, and also that he is active in the sense of (a) possessing a range of complex expressive capacities which systematically and consistently operate in relation to the progress of the interactions; and (b) manifesting, in the signs of distress and bewilderment upon disruption to the communication process, a degree of commitment to the establishment and maintenance of a synchronous, two-way exchange.

These factors, and moreover the appropriateness in personal terms of the babies' various reactions to the different perturbations, lead us to conceive of the infant as in some important sense a personal and social being, at least from the age we are considering here. However, although the evidence presented so far has consistently led one to draw these conclusions, it was thought that a demonstration of the effectiveness of the baby, in the context of an interaction - a feature not so far directly considered, would strengthen the case still further.

CHAPTER 7

THE EFFECTIVENESS OF THE INFANT IN INFLUENCING THE MOTHER

In our study of the interactions between mothers and their young infants, rudimentary receptive and expressive capacities, essential to full cooperation, have been revealed in infants from 6-12 weeks. The infant's sensitivity and responsiveness to various changes in both the form and timing of the mother's behaviour has been shown, with systematic and patterned expressive acts of the infant being found, from detailed film analysis, to accompany such changes in what the mother does. However, we now have to consider the communicative and interactive significance which the infant's capacities of expression and responsiveness may hold for the partner. Only if the infant's effectiveness is established are we justified in attributing to him a fully active role in their exchange. For it is not sufficient to be able to detect changes in the infant on film which can be slowed down and studied in detail; we have to examine their impact on, and significance for, the partner in the course of their interaction.

Although it has been noted (e.g. Snow, 1977a; Kaye, 1977; Trevarthen, 1979; Newson, 1977) that mothers both feel and behave as though the infant is communicative and responsive to their acts, this does not constitute sufficiently hard evidence to confirm our hypothesis. We need to show that the mother's perceptions have some validity, i.e. that the infant's acts, being related to the mother's, are correctly perceived by her to be so. Thus the infant's sensitivity to the mother's communication (which we have demonstrated) is only truly adaptive if the mother is in turn affected by the infant's behaviour as part of that communicative exchange. On the whole this kind of claim is contested by, for example, Kaye, Schaffer and Snow, and unless

one proves it to the contrary, one could still acknowledge the infant's responsive and expressive abilities which have already been demonstrated, yet regard them as unimportant at first; for the interactional structure of what goes on, and attribute responsibility for the exchange-like impressions almost exclusively to the mother. She may not be influenced at all by those elements which we pick out in film analyses, (which thus would have no active involvement in the course of the communication) but may take on a major constructional role, for example filling in pauses in the flow of more autonomous infant activity.

Review of the literature on the effects of child variables on others

In 1971 Rutter was led to state that "the child's contribution to parent-child interaction is a most important, but much neglected subject". However, today several authors writing about the problem at the level of early face-to-face communication attribute the interactional outcome entirely to the constructions of the mother. Yet, there is quite consistent evidence from other kinds of studies of parent-infant relationships, of the positive impact of the infant in various ways on the nature of the interactions that obtain. Such evidence has influenced the theoretical perspective in this field, resulting generally in a redress of emphasis. Previously, as Bell (1968) states, "a one-way influence of parents on children was assumed"; however, studies which failed to recognise any notion of interaction or of the influence of children on parents yielded little in the way of stable associations between measured differences of children and differences in caretaking techniques. On the other hand, those which did take account of individual differences between children and allowed for interaction effects disclosed more consistent patterns and Bernal (1974) states, "there is now some acknowledgement of the mistake of minimizing the child's part in the development of the relationship".

Those aspects of the infant found to have an influence on the interaction range from more stable aspects, like constitutional ones (Moss, 1967; Schaffer and Emerson, 1964; Bell, 1968), to more transient characteristics, like the momentary state (Levy, 1958). Thus Moss found, in a study of mother-infant pairs from 3 weeks to 3 months, that changes in the mother's behaviour were associated with the age of the infant and degree of irritability, which was sex linked, and these accounted for differences in the mother's social contact with boy and girl infants. Yarrow (1963) found that the same foster mother showed marked differences in behaviour towards two infants of the same sex and age assigned to her at the same time. Characteristics of the infants appeared to have evoked different behaviours in the foster mother, and the usual explanations of such differences on the grounds of ordinal position, or sex of siblings could be ruled out.

Schaffer and Emerson (1964) concluded in their study of 'non-cuddly' babies that the non-cuddlers' avoidance of close contact was concerned with a phenomenon not peculiar to the mother-infant relationship, or indeed to social relationships in general, rather it was a function of inherent characteristics with the consequence that the nature of the interaction with the mother was greatly affected.

Fraiberg (1979) describes how, in mother-blind infant pairs, the lack of eye-eye contact, more unreliable smiling and more undifferentiated facial expressiveness lead parents to perceive the infant as unresponsive and apathetic. This itself makes the establishment of greeting and acknowledgement routines and consequent interactions more difficult. Brazelton (1961) emphasises the infant's innate strength "in influencing his environment to *adjust* to him in a particular way, consistent with his characteristically individual needs". He shows how abnormality in one neonate persisted and manifested itself in acute state changes from a level of marked unresponsiveness to one of hyperreactivity: this

influenced the mother's capacity to mother him to a marked extent. Although the outcome was not entirely dependent on his constitution, this particular baby exerted a strong influence in determining the characteristics of the mother-child relationship. His unreachable quality had the effect of depressing the mother, and his difficulties thus quickly became reinforced by the interaction between him and his environment; this pattern of mutual interaction is also demonstrated in the two cases described by the Robertsons (see p. 41).

Baby talk as an adaptation to infant and child characteristics

Recent literature on mothers' baby talk to their infants amply illustrates the same process of the parent's' behaviour being influenced by characteristics of their infants. In a study in which particular attention was paid to the interactional character of what went on Lieven (1978) looked at mothers and their infants from about 17 to 30 months. She noted that,

"... the effects of particular styles of speech may be two-way, even between a 2-year-old and an adult. An analysis of my (the investigator's) speech to the children indicates that the differences in their speech may have influenced the way that I spoke to them ... The way in which the investigator responds to the two children is somewhat different, and that furthermore it is in each case more similar to that of the mother to whose child she is responding at the time than to the mother of the other child."

With regard to any suggestion that Lieven was imitating each of the mothers she remarks,

"... my impression is that these figures reflect a possible influence of the child's speech on the adult ... a child, by virtue of the way that she/he talks may be influencing the way which other people speak to him."

Snow (1972) and Phillips (1973) found mothers' speech to vary in simplicity and redundancy according to the age and presence of the child. A complementary study (Snow, 1976) showed that in turn children

were more attentive to, and could follow instructions better from, such modified speech. She concludes

"All these experiments taken together show that children are in some sense demanding a certain speech style from the adult. By becoming inattentive to and noncomprehending of more complex speech styles, they consistently cue the adult speaker as to what level of complexity and redundancy is necessary."

In a study of interactions between mothers and infants of 3-18 months, Snow (1977a) showed that baby talk changed along parameters of reference and syntax coinciding with developments in the quality of what she terms "turn-taking" and changes in the child's focus of attention and interest, showing, she claims, that mothers attune their speech to the child's growing interest in objects and activities outside themselves. Snow (1977b), in a case-grammar analysis of mother's speech to 2-year-olds, showed the speech was cued by what the child typically says and tries to say as well as by his attentiveness and comprehension.

In a very comprehensive study relating several characteristics of mother's baby talk to a large number of child listener variables in children from 19-31 months, Cross (1977) found that a score computed for the child's receptive and comprehensive ability correlated more highly than any other aspect of the child's performance with the mother's speech changes. She argues from this that mothers' baby talk is finely attuned to the child's psycholinguistic development.

Sachs, (1977) in a study of several features of mothers' baby talk such as pitch, rhythm, use of initial stop consonants, found these related closely both to the infant's perceptual sensitivities and to the infant's own productions, and he too suggests therefore a fine tuning of adults' productions to the infants' sensitivity.

The conclusions arising from this corpus of work corroborate those of the studies outlined above which looked at the effects of the infant on the quality of the interactions. However, we are not justified at this

point in extending these results to describe the detailed ongoing events of the face-to-face interactions between mothers and infants with which we are concerned ^{in such a way as} to conclude that the infant is an active participant [^] in the sense required. For it is not sufficient to show ^{for example that} the amount of social contact, or the type of speech generated is related to relatively enduring or autonomous qualities in the infant or child like his state, receptive-comprehensive ability or the quality of his/her own speech; for one could still say that the infant is relatively passive and the mother is being caused to adapt by simple cues peripheral to the ongoing give and take process of interaction.

Adult Interaction Studies

Studies which have been done on adult-adult conversations reveal participation at a fine level by the listener, who is considered to play an active part both in the nature and outcome of communicative encounters (e.g. Duncan, 1972; Duncan and Niederehe, 1974). In order to look at receptive and productive processes, Ferguson (1975) examined the nature and context of various types of interruptions and speaker-switches in spontaneous and unstructured conversations between pairs of friends. Analysis of where the different types of speaker-switch occurred in the dialogue indicated that conversation overlaps of any kind could not be said to be caused by one person alone, but occurred as a joint process. The overlaps (imperceptible to both partners and observers) happened at systematic points, e.g. where there were such turn-yielding cues as described by Duncan.

Application to mother-infant interactions

This is more the level of interaction and analysis with which we are concerned here, and we have to ask whether such allocations of turns is a mutual process in early mother-infant interactions, that is, whether

the infant's detailed and fine responsiveness to the ongoing course of the mother's communications (see Chapters 4-6), responsiveness whose form alters and fluctuates from moment to moment throughout, is part of the interactive process and continuously relevant to the mother's behaviour.

In observational studies there has frequently been ambiguity on this issue, at times making for theoretical divergence (see Introduction). Thus, as we have seen, on the one hand Schaffer, Kaye and, to some extent, Snow, lay emphasis on the mother's constructional role, seeing the interchange as the outcome of a one-way direction of effect, whereas on the other Trevarthen, Fogel (1977), Brazelton (Brazelton et al, 1975) and Bruner (1977) conceive of the exchange as a more mutually active 2-way process. An example may illustrate the point: Snow (1977a), in a description of the changes occurring in the style of mothers' baby talk accompanying the infants development from three to 18 months considers the infant, at the earliest age she observed, to be a relatively poor conversational partner in that he is fairly inept at 'turn-taking'. This conclusion is supported by reference to several features of the mothers' baby talk; e.g. the very high frequency of interrogatives, the high degree of repetition and the frequency with which the mother answers her own questions. These, Snow thinks, are the outcome of the mother's trying to hold a conversation with an immature and inept partner. Thus, the high frequency of questions is thought to arise from the question form being a device to pass on a turn to the partner; after Sacks et al (1974), self-answers are seen as a conversation "repair" device, brought into play as the infant does not provide an answer himself, and maternal repetition likewise is seen as a consequence of lack of response in the infant. These factors combine to lead Snow to emphasise the onesidedness of the structuring process in the exchange. "It is she (the mother) who is imposing on the interaction the rules of

conversation". Although certain aspects of this analysis are enlightening, and particularly the conception of the mothers' baby talk as adapting and changing in response to the infants' imperfect but developing interests and his/her capacity to express this to some degree in mutually negotiated and recognised forms, the nature of Snow's interpretation would seem to be questionable. Other workers considering the same phenomena, draw somewhat different conclusions. Snow's interpretation may be due to the criteria she uses for categorising the infant's activities as 'utterances' or 'unit parts' in the exchange. These she defines as infant acts to which the mother explicitly and consistently refers as she talks to the baby, e.g. 'smiles', 'burps'. Other activities such as 'crying' or 'arm waving' are generally not referred to in a predictable way, and are thus not taken into account as constituting unit parts in the infant's repertoire. That this might give a misleading impression of the infant's responsiveness in the interaction is indicated by several factors.

In studies (see p. 166 above) of adult-adult conversations it was noted that speaker-switch points which were found to be systematic and patterned in the conversation context upon micro analysis, were quite imperceptible both to the speakers themselves and even to observers who were cued to look out for them (Ferguson, 1975). So we should not perhaps expect mothers to be consciously aware of, or ^{to} explicitly acknowledge, potential cues to signal the onset or offset of an 'utterance' in the infant. To restrict one's definition of an infant's utterance to actions explicitly acknowledged in a predictable way by the mother may mean ignoring activities in the infant which nevertheless do influence what the mother does, and so underestimate his competence as an active partner in the exchange. That this may have been the case in Snow's study is indicated by the results of, e.g. Fogel (1977) and Lewis and Freedle (1973). Fogel found that behaviours to which

to which both

it appears both partners are mutually responsive and react in systematic ways are not necessarily like the categories of acts defined as unit types by Snow, which are, she says, typically content related, e.g. having wind, or giving a smile, but can consist of various facial behaviours. Thus Fogel found an exaggerated mouth posture in the mother to co-occur with an 'open-mouthed' posture in the infant. Lewis and Freedle found with 12-week-old infants that 'fretful crying' was the next likeliest behaviour after vocalizing to elicit a maternal utterance, yet Snow does not include fret/cry as a unit type in her data.

Other evidence which would also indicate that Snow's account has underestimated the infant's role in these early exchanges through her having too narrowly defined the infant's turns is yielded in studies on repetition and self-answers. These features of the mother's baby talk are, as noted above, taken by Snow to reflect inadequate responding by the infant, e.g. seeing a self-answer as a conversational repair device. Yet others have offered interpretations of these same phenomena as relying on more active participation by the infant or child rather than unresponsiveness. Gleason (1977), while noting the obviousness of repetition in the context of unresponsiveness in 18 month olds, points out that one important kind of repetition occurs where there is no unresponsiveness but, on the contrary, comprehension and compliance on the part of the child. Here Gleason thinks it serves what Luria called the 'directive function', providing 'inner speech' for the child, and he believes this also applies in some cases of self-answering. Stern (1977) holds that repetition is a very general feature of behaviour addressed to infants, serving to attract and hold the attention and functioning as a basis for the expression of theme and variation, and, furthermore, he finds infants more likely to smile to the mother during a run of repeated phrases than at other times. Also Bingham (1971) found infants

are addressed in a simplified register by mothers who judge them to understand quite well, not by mothers who set a lower estimate on the infant's capacity. According to Papousek (1977 and pers comm) a mother's repetitions occur when the infant is responsive and attentive, and only when his attention wanders does she modify her behaviour again. Thus it may be the case, that features of mothers' baby talk which are seen by Snow to result from the infant's unresponsiveness in fact rely on the infant's being a more competent and responsive partner than she assumes.

EXPERIMENT TO TEST THE EFFECTS ON THE MOTHER OF THE BABY'S ONGOING EXPRESSIONS AND RESPONSIVENESS

In order to examine the idea that the infant's action might be related to what the mother does, and moreover, that it is perceived and felt to be so by her, thus having the interactive quality of the communicative actions of adults in conversation, the same double video technique was used which was employed to test the infant's sensitivity to the timing of the mother's actions in relation to his own (see Chapter 6). In this case the situation is presented from the point of view of the mother who is presented ^{Shown} first of all with a live, real-time image of her infant, followed by a replay of exactly the same film sequence that she saw before. The situation is described in detail above (p. 144).

According to the theory proposed by Kaye, where there is "merely an endogenous cycle onto which his mother imposes a discrete exchange of turns" (Kaye, 1977), that of Schaffer and, to some extent that advocated by Snow for young infants, the timing of the display to the mother should be irrelevant. For if the mother is the active partner and her task is to structure the infant's bursts and pauses into a seeming interchange by filling in the gaps, or to make conversational capital of such events as smiles or burps, then her task in talking to the infant in the two conditions described is no different, since the infant's

behaviour is the same in both. The fact that one display is in real time, and one prerecorded should be of no consequence. On the other hand, we should expect the mother to differentiate the two conditions if we assume that she is affected by the infant's responsiveness to what she does, since he is potentially responsive only in the live condition. When presented in the replay condition, the infant's actions, although precisely the same as before, lose any interactive qualities which they may have possessed by virtue of their interrelations in time and context with the actions of the mother.

The design of this experiment is simultaneously relevant to the more specific issue within the literature on baby talk referred to on p.164 . As we have already noted, Snow's model for early baby talk assumes the infant to be largely passive and unresponsive in the conversation, an inadequate partner not yet capable of reciprocal turn taking. According to this viewpoint we should, as for the models put forward by Schaffer and Kaye, expect the mother's behaviour and particularly her baby talk, not to differ between talking to her 'live' baby and a replay of him. On the other hand, Snow herself (1972) finds for a later age (2 years) distinct differences in the mothers' baby talk to their children depending on whether the mother can receive feedback from the child or not, the situational variable here being the presence of the child in the same room as the mother. Snow notes in a further paper (Snow, 1976) that it has not been established precisely which cues are responsible for this difference in the mother's behaviour in the two conditions, and she goes on to say that the test of whether the mother's response is due merely to the presence/absence of the child, or to the finer feedback variables available in the 'present' situation should be made by comparing situations where the child is present and responsive, or present but giving no feedback. It is proposed that the experiment described here ideally fulfils all the criteria necessary

for such a test. Moreover, it meets the demand of the child's behaviour being exactly the same in the two conditions, the only and crucial difference being whether he is at least potentially responsive to the mother's behaviour.

If what the mother does is partially influenced by what the infant does as a responsive partner, i.e. if the timing and nature of the infant's acts in relation to the mother's is important as of one partner's acts in a two-way communicative exchange, then one should expect the mother's baby talk to differ in the two conditions. If however, what is primarily responsible for the mother's behaviour and speech are cues afforded by the appearance before her of the child, his behaviour as a whole, yielding indirect information as to his receptive and conceptual level, typical focus of attention and nature of interests and awareness, then one should not expect the two conditions to provoke differences in the mother's behaviour, since from this point of view they are equivalent.

This experiment addresses itself, then, to two related problems. The first is of paramount interest from the point of view of the nature of the infant's social capacities, that is, the question of the interactive status of the infant's early behaviour and, in particular, whether the receptive and expressive social skills are communicative at this age and have a regulatory function in influencing the course of the interaction. The further question, of secondary significance here, lies within the framework of the theory of baby talk. As noted above, the issue is whether mothers' baby talk, or features of it, are adapted to the specifically interactive nature of the infant's acts at this age.

METHOD

With mother and baby positioned in the double VTR situation to interact with each other, as described above, live recordings and then

replay presentations of the baby were relayed to the mother, who was asked to chat naturally to her baby. Both her speech to the baby in these two conditions, and her ratings of the baby's attentiveness to her were then compared.

Subjects

The subjects were eight mothers and their babies - five boys and three girls, aged eight weeks, mean age 8.5 weeks, range 8.0 - 9 weeks.

Procedure

Selection criteria, arrangement of the visits to the laboratory, and procedures for making mother and baby comfortable prior to the experimental session were the same as for the other experiments.

Instructions to mother

The mother was told that we were interested in the social development of infants: she was asked to chat as naturally as possible to her baby, and was led to believe that the image of her baby would be presented to her in live time in all the sessions.

She was asked, during the pauses between presentations, to rate on a five point scale the degree to which she felt that her baby had been responsive and attentive to her during the preceding interaction.

When the subjects were ready, mother and baby were taken into the room where the baby was to sit, and the mother settled the baby into his chair; whilst she went through to the adjoining room the experimenter talked to the baby until the mother, then in the double video situation herself, attracted the baby's attention. When they appeared to be communicating naturally, audio recording of the mother's speech for the first live condition began.

The mother was presented with four sections of video film of her infant, each lasting $2\frac{1}{2}$ minutes. Two of these sequences were live

presentations, and two were replay recordings of these same live sequences. The order of presentation was obviously limited in the sense that the replay sequences necessarily followed their live counterparts. The film sequences were interspersed by pauses of approximately one minute during which the mother was asked to fill in a five point ordinal scale on the extent to which she felt that her infant had been attentive and responsive to her in the preceding session. During this interval the videotape, out of the mother's sight, was either rewound in preparation for the replay condition, or stopped and then reset for the following live sequence presentation.

The infant sat in an infant chair in the adjacent room, in front of a video image of his mother. An adult experimenter stayed in the same room throughout, to make sure that the infant was not distressed, and during the replay conditions the adult turned the infant in his chair away from the screen and chatted to him. The experimenter also took note during the live sessions of whether or not the infant performed any behaviour which it was thought might be recognised by the mother when shown in the replay condition, and so cue her as to the nature of the experiment, such behaviours might have been vomiting or slipping to one side in the infant chair. Fortunately, the one such incident which occurred did so right at the end of a live sequence, and this part of the film was not replayed to the mother.

All eight pairs of subjects completed the four conditions, except one; in this case the infant became distressed a short way through the second live condition, thus only the first live and first replay sequences were obtained for the pair. The total number of live and replay sequences for comparison was therefore 15, first live and first replay conditions for all eight subject pairs, and the second live and second replay condition for seven.

The mother's speech to their infants was chosen as the behavioural parameter for analysis, this having been shown to be responsive to a wide range of child listener variables (Cross, 1977).

Categories of analysis of the mother's speech

The following features were selected for the analysis of the mother's speech in the two experimental conditions, and fall into three main groups.

Group I: Utterances reflecting the quality of rapport experienced by the mother:

There have been few studies on speech to infants at the age under consideration here, and when they have been done, e.g. Stern, 1977, Sylvester-Bradley and Trevarthen, 1978, Snow, 1977, the question of qualitative differences between interactions being reflected in speech styles has not been the primary concern, rather, concentration has been focused on developments coincident with age changes. We have, therefore, had to devise parameters of content analysis of our own and, unfortunately, to extrapolate from studies on older children in drawing up categories for analysis. It is claimed to be valid to draw such a parallel, however, on the grounds that qualities peculiar to mutually coordinated and 'successful' interactions are general, and not specific, and are reflected in speech style.

Thus, Winnicott's (1965) descriptions of early healthy mother-infant relations in terms of 'mirroring' or 'holding' match in essential respects the qualities of 'responsive' and 'accepting' mothering described by Anisworth for older mother-infant pairs. Whilst being aware then, as Lieven and McShane (1977) and Dore (1978) were, that to draw strict analogies between functions at a prespeech level and those emergent with the acquisition of language may lead one to miss vital differences and fail to account for the nature of developmental change, nevertheless, the parallel is felt to be justifiable in this particular case. We are

concerned here with aspects of the regulation of interpersonal interaction which transcend the needs of language.

In the literature then, both ⁱⁿ that on differing qualities of interaction between mother and child (e.g. Anisworth's scales), and in that on the development of speech and the nature of baby talk, a consistent cluster of features of either maternal behaviour or speech style is found to distinguish interactions ^{according} to the extent to which there is

- a) a degree of coordination or mutual responsiveness between the interactants, or
- b) the child is adept at using language to express his needs and interests.

Such features tend to have the common characteristic of being what we may term "infant motivated" or "infant centred", rather than "mother, or other motivated or centred". This is the kind of contrast drawn by Cazden (1972) to distinguish the psychological impact of using expansions as opposed to corrections:

"... the expansion in substance and tone focuses on how much the child has already achieved, while still pointing in the direction for further growth; the correction stresses the gap still remaining between where the child is and where he is supposed to arrive."

Thus, in interactions which show the mutually responsive qualities described above one generally finds the following characteristics of maternal speech: few directives or imperatives (Snow, 1976; Nelson, 1973; Ringler, 1975; Newport et al, 1977; Lieven, 1977; 1978), fewer prompt questions (Lieven, 1978), fewer corrections (Cazden, 1972; Lieven, 1978), more expansions and extensions (Cross, 1977; Lieven, 1978; Cazden, 1972; Newport et al, 1977; Snow, 1976), and more genuine questions (Lieven, 1978).

If our hypothesis is correct that the infant is indeed an active participant in the ^(what happens) interaction we should expect the mother's behaviour in the 'live' condition to show more of the features typical of well

synchronised interactions, compared with her behaviour in the 'replay' condition where one should see more indications that the mother finds the infant an unresponsive partner. On the basis of the above findings and considerations, and a study of [redacted] the mother's baby talk in this experiment, the first group of categories was drawn up for the analysis of the mother's speech which, it was proposed, would differentiate the two experimental conditions.

A. Negative Statements

This category was not, in fact, as were the others, drawn directly from previous studies in the literature of mother's baby talk, which consist mainly of stylistic parameters rather than variations in content, but was derived from the study (blind as to conditions) of the corpus of speech in this experiment, and is specific to the particular issue here of whether or not the mother feels that the baby is responsive to her communications. [redacted] "Negative statements" are held to indicate that the mother feels that the infant's attention is not focused on her in positive communication, and we would predict there to be a higher incidence in the replay condition. The expression of such a feeling can take various forms, ranging from explicit statements, to utterances about the infant's mood which carry the implication that the infant is not in positive communication with her. Examples below are taken from the corpus of the mother's baby-talk.

a) The mother states explicitly that the baby is not interacting with her: e.g. "You're not interested in your mummy, eh?";
"You're ignoring me again, then, aren't you?"

b) Statements about the infant's attention being focused on something other than the mother, as in:

"You're too interested in your fists";

"I think you're looking at your fingers";

or it can take the form of asking the infant to look in her direction, implying that he had not been, or is not concentrating on her, e.g.:

"John, come on, look down.";

"Look back at me."

c) The mother may question whether or not the baby is physically able to pay attention to her - whether he can see or hear her properly, e.g.:

"Can you see me, little man?"

d) The mother may feel that the infant is in a state or mood, or pre-occupied in a way which would seem to preclude his interacting positively with her, e.g.:

"Are you fed up with this game?";

"Oh, my goodness, you're a sleepy boy."

e) The mother may comment on her own difficulty in interacting with her baby, e.g.:

"I'm running out of conversation.";

"I can't do anything if you won't talk to mummy."

B. The second category in this group draws the distinction between child, mother, or other-centred utterances.

'Child centred': these are made up of 3 sub-categories:

a) genuine questions, i.e. questions where it was judged the mother did not know the answer, and which related to an activity which the child had just completed or was currently engaged in, e.g.:

"What can you see up there?"

b) expansions, utterances which are references to the child's activity or to the child as subject or focus of interest which is not elaborated along some dimension of meaning, e.g.:

"Whoops, there's that hand again";

"You're chewing away."

c) extensions: utterances as above, but which are further developed along some direction of meaning, e.g.:

"What a big yawn for a little boy."

These, we should expect to occur more frequently in the 'live' condition.

Mother centred

a) Directives - strong commands or suggestions, e.g.:

"Sit right up"; "Come on".

b) Prompt questions - those to which the mother is judged to know the answer, or explicitly requests a particular action by the infant:

"Are you looking up?"; "Let us see a big smile";

"Give us a noise."

c) Calls for attention - calling the child's name or uttering exclamations, e.g.:

"Hey, bright eyes"; "Oy, little man."

d) Utterances which seem to be about or for herself -

"Here's my finger"; "Here I am"; "Oh, dear".

e) Corrections, e.g.:

"Oh no, that's not a smile."

These are hypothesised to occur more frequently in the 'replay' condition.

Other centred

a) Immediate - utterances which refer to events, persons or objects in the immediate recording situation, or;

b) Non immediate - utterances referring to events, persons or objects spatially or temporally removed from the recording situation. These are expected to occur more frequently in the 'replay' condition, particularly the non-immediate kind.

C. Syntactical forms The third category in this group is comprised of less interpretative discourse features, variously found in the literature to reflect the quality of relationship or interaction (Leiven, 1977; 1978; Newport et al, 1977; Ringler et al, 1975; Bernstein, 1970; Cross, 1977; Snow, 1977b; Sylvester-Bradley and Trevarthen, 1978).

a) Incidence of declaratives: ratio of number of declaratives to total number of utterances.

b) Incidence of imperatives: ratio of number of imperative utterances to total number of utterances.

c) Incidence of interrogatives: ratio of number of interrogative utterances to total number of utterances.

d) Incidence of contentless utterances: ratio of number of contentless utterances to total number of utterances (see Snow, 1977a -

verses, songs). On the basis of the work quoted above we should expect the first two to occur predominantly in the 'replay' condition, and the second two in the 'live'.

Group II: "Conversation Repair" or Contact Seeking Devices:

The second group of features relates to Snow's analysis of interactions with 12 week-old infants (Snow, 1977^h) and particularly to the basis for her claims that the infant is, in an important way, an inadequate conversational partner at this age, i.e. the high rate of questions, self-answers, and degree of repetitions. If the infant is unresponsive and ineffective then these features should not differ in their distribution across the two conditions. If, however, there is a different distribution and Snow is correct in thinking these features reflect the infant's relative inadequacy as a conversational partner, being, she maintains "Conversational repair" devices, then they should occur more frequently in the 'replay' condition. On the other hand, if, as suggested here, they reflect the mother's adaptation to more positive participation than Snow supposes, we should see more in the 'live' condition.

The incidence of 'questions' has been covered in Category C of Group I. The remaining categories to be scored here then are:

- A) the incidence of self answers: the ratio of the number of utterances which are self answers to the number of questions; and
- B) the degree of repetitiveness: this can be subdivided into 3 categories:
 - i) the incidence of complete repetitions: the ratio of the number of utterances which go to make up a simple 'run' (a run contains at least two consecutive exact or almost exact repetitions of an utterance - see Stern, 1977), to the total number of utterances;
 - ii) the mean length of repetitive runs: i.e. the mean number of utterances which these runs contain;
 - iii) continuity of reference: the mean length of semantic runs, (the latter) having the same topic of reference in consecutive utterances.

Group III: Indices of the 'Complexity' of the Mother's Utterances

The third group of categories is relevant to the issue raised in Snow 1972 paper in which a comparison was made between a mother's speech to her 2 year old child when the child was in the adjoining room out of sight ('absent' condition) and her speech when the child was present with her. Here it was generally found that syntactically less complex and more repetitive speech occurred during the 'present' condition. The question was later raised (Snow, 1976, see above p.171) as to whether these differences were due to fine interactive feedback variables being ruled out in the 'absent' condition.

Although it is not clear in this case whether such measures of complexity are a reflection of more permanent characteristics of the relationship like the degree of mutual coordination between mother and child, rather than a function of the age or development of the child, it was thought to be of interest, in the light of the issue raised above, to apply this kind of analysis to the mother's speech in the two situations here: if the baby is an active partner in the interchange, and if these categories are sensitive to finer feedback variables then the 'live' condition should provoke simpler and more repetitive speech than the 'replay'. The categories for analysis in this group are then:

- A) mean length of utterance (M.L.U.);
- B) the mean preverb length;
- C) the incidence of utterances lacking verbs: ratio of utterances that did not contain verbs to the total number of utterances.

Since the degree of repetitiveness had already been incorporated into the second group of categories above it was not included here.

Scoring

Audio tape recordings were taken of all experimental sessions. These were transcribed and the speech then divided into constituent

utterances which were delimited by pauses and intonational cues. Thus fragments of sentences and phrases were counted as utterances if they had a complete intonational pattern.

All sessions were scored blind for the type and content of utterances. Categories in Groups II and III, and part C of Group I were scored by the experimenter alone since they required only simple counting procedures. However, categories in Group I, parts A and B involved subjective judgments rather than being based on logical linguistic axioms, and were thus scored blind by an independent observer and by the experimenter. Agreement on these measures was, in fact, very close, ranging from 86% to 93% across the different sessions. Where allocations to categories differed, reference was made again to the audio tapes, which cleared up most ambiguities. Any remaining differences were resolved by taking the mean of the two scores as final.

RESULTS

Mother's judgments of attentiveness

The results of the mother's judgments on the five-point ordinal scale, in which they were asked the extent to which they felt that the infant had been responsive and attentive to them during the video sequence they had just seen are shown in Table 7.1: it can be seen here that there are no real differences between the two conditions, and on the basis of this we have to conclude that the mothers were certainly not consciously aware, at least not in retrospect, of the lack of responsiveness in their infants during the Replay condition.

Results of the distribution of the various utterance types

The incidence of the various speech features for analysis was compared between the two sets of Live and Replay conditions; the scores for all subjects according to condition were submitted to the Sandler's A Test (see Haber & Runyon, 1973), 1 tail, as directional predictions were invariably made.

TABLE 7.I

(Mothers)

Ordinal Scale Judgments of Infants' Responsiveness

Subjects	Conditions			
	L1	R1	L2	R2
1	3.0	3.0	3.0	3.0
2	4.0	3.0	3.0	3.0
3	3.0	4.0	4.0	5.0
4	4.0	4.0	4.0	4.0
5	2.0	3.0	4.0	3.0
6	2.0	2.0	4.0	4.0
7	3.0	3.0	2.0	1.0
8	4.0	4.0	-	-

Judgments along a five point scale assessing the extent to which the baby was attentive and responsive to the mother throughout each condition, ranging from 1, extremely attentive and responsive, through to 5, barely responsive/attentive.

A. 'Negative' Statements

A comparison of the incidence of 'negative' statements, i.e. those described on p. 177 which are held to indicate that the mother feels that she and the infant are not cooperatively communicating, reveals significant differences at .05 level for the first Live vs. first Replay conditions, and .005 for the second Live vs. second Replay conditions. That is, there is a greater incidence of such statements in the replay condition, which confirms our hypothesis that the mother's behaviour is at least partially an adaptation to the progress of the joint communication between her and her baby.

This seems to be a general effect in the sense that if one compares the 'Live' and 'Replay' conditions for the incidence of each of the sub-categories of these negative statements, the direction of effect between 'Live' and 'Replay' is the same throughout.

B. 'Child', 'Mother' and 'Other' centred categories

The results of the analysis of 'child', 'mother' and 'other' centred categories are consistent with those for the negative statements. A significant difference was found between both the incidence of child centred statements and mother centred statements in both sets of Live and Replay conditions, there being more child-centred statements in the Live conditions than in the Replay, and more mother centred statements in the Replay than in the Live conditions. In the comparison of the incidence of other-centred utterances, although both sets of sessions gave results in the same direction, showing a higher incidence in the Replay condition as predicted, they only reached significance (at .05 level) in the comparison between Live II and Replay II conditions.

In order to see whether the quality of mother-centred or child-centred utterances changed in relation to the Live or Replay situation, a further comparison was made of the relative incidence of each of the different utterance types within either the mother^{or}/child-centred group, between the two conditions. The relative incidence of different utterance types within the mother-centred category was not found to be significantly different between the two conditions; however, within the child-centred category the relative incidence of questions and expansions did alter: there was a higher relative incidence of genuine questions in the Live conditions, significant at .025 level for the first set, and .05 level for the second set, and a relatively higher level of expansions in the Replay conditions, significant at the .005 level for the first set, .05 for the second. The difference in the degree of use of extensions however failed to reach significance between the two conditions, although the trend was for there to be a greater proportion in the Live condition. The implications of these differences are discussed further below (p. 188).

The distribution of 'immediate' vs. 'non-immediate' utterances within the 'other' centred category was in the ratio 3:2 in the Live condition, but conversely 1:3 in the Replay .

C. Syntactical Forms

The results of the distribution of other measures of discourse, style, i.e. the syntactical forms used, which have been seen as being coordinated with distinct semantic intentions (Shatz and Gelman, 1977) and which are seen as reflecting different modes of psychological control (Bernstein, 1970) consistently confirm the predictions outlined above.

The results show a higher incidence of declarative statements in the Replay condition (significant at .025 level for the first set, and at .01 level for the second). Likewise, for imperative statements; although no significant differences were found for either set, the mean incidence of imperatives was higher in both Replay conditions.

On the other hand, the overall incidence of interrogative forms, is, as predicted, significantly higher in the Live condition for both sets of comparisons, significance levels being .025 and .05. This is consistent with the findings above for genuine questions.

For contentless utterances too, the tendency was for there to be a higher incidence in the Live condition, although this was not significant for the first set of comparisons, but significant at .005 level for the second.

The results for this first group of categories are summarised in Table 7.II, and show the distributions of the different utterance types according to the pattern of predominance, i.e. whether they occur more in the Live or Replay conditions.

Results for the categories of Group II

The results for this group are also summarised in Table 7.II.

TABLE 7.II

Table showing distribution of different utterance types
across live and replay conditions

Group I: Quality of RapportUtterance types predominating in Live conditions

	<u>Live I</u>	<u>Replay I</u>	<u>Live II</u>	<u>Replay II</u>
Category B:				
Child centred utterances	+	- .005	+	-.005
Category C:				
Interrogatives	+	- .025	+	-.05
Contentless	=	= N.S.	+	-.005

Utterance types predominating in Replay conditions

Category A:				
Negative statements	-	+ .05	-	+.005
Category B:				
Mother centred	-	+ .05	-	+.05
Other centred	=	= N.S.	-	+.05
Category C:				
Declaratives	-	+ .025	-	+.01
Imperatives	=	= N.S.	=	=N.S.

Group II: Repair and Contact Seeking DevicesUtterance types predominating in Live conditions

Category A:				
Self Answers	=	= N.S.	+	-.05
Category B:				
Repetition				
(i) Complete repetitions	+	- .01	+	-.005
(ii) Mean length repetitiveness	+	- .05	+	-.05
(iii) Continuity of reference	=	= N.S.	+	-.05

A) Self-answers

The results on the ratio of the number of self-answers to the total number of utterances for each condition show no significant differences for the first set of Live vs. Replay conditions. The second set yields a difference at .05 level, there being a higher incidence in the

Live condition.

B) The degree of repetition

i) The incidence of complete repetitions. The first set of comparisons gives a significant difference between Live and Replay conditions at .01 level, there being more repetition in the Live condition.

Likewise, the second set of comparisons yields a significant difference in the same direction (significant at .005 level).

ii) We find furthermore that the mean length of such repetitive runs in terms of the number of utterances which constitute them is significantly higher in the Live conditions, at .05 level for both sets.

iii) The other test of the degree of repetitiveness or consistency is that for the continuity of reference. It was found that semantic runs, i.e. consecutive utterances with the same topic of reference, independent of form, were longer in the Live conditions for the second set of comparisons (.05 level), but no significant difference appeared in the first set.

3. Results for Categories of Group III - describing 'complexity'

Within categories generally taken to reflect the complexity of speech, all measures (M.L.U., mean preverb lengths and the incidence of utterances without verbs) failed to differentiate beyond chance level between the two conditions, with the exception of the second set of comparisons for mean preverb lengths which reached significance at .005 level, there being shorter mean preverb lengths in the Live condition.

DISCUSSION

These results generally confirm the predictions outlined above, with consistent changes occurring in both the style of the mother's speech (in terms of syntactic forms and measures of repetitiveness), and

in the content, across Live and Replay conditions. More 'negative' statements, of all types, and more 'mother-centred' utterances, in which the initiative is located in the mother (directives, prompt questions, calls for attention, corrections and statements having reference to the mother herself) occur in the Replay condition. On the other hand 'child-centred' utterances - the group of genuine questions, expansions and extensions, which are characterised by the initiatives being inferred from the actions of the infant have higher incidence in the Live condition.

Furthermore, interesting differences have been found to occur between the two conditions within some of these categories which reinforce this trend. Thus, the 'child-centred' measure which is perhaps the least child-centred - the expansions - tends to be the most often used form in the Replay condition. In the Live condition question forms predominate. This difference is further reflected in the higher incidence of declarative statements in the Replay condition. These findings are consistent with those presented by Cazden in a study of the differential effects feedback, either exclusively in the form of 'modelling' (equivalent to extensions here) or else by 'expanding'. He found that the syntactic development of 28-38 month old institutionalized children improved more under the modelling regime. Bates et al (1975) define the declarative as a particular type of imperative which commands the unique epistemic act of assuming some proposition as a command for the listener to attend to, or assimilate some piece of information.

Similarly, in the 'other-centred' category, the non-immediate utterances of this kind tend to be more typical of the Replay condition; in the Live condition, however, if the mother does make remarks which have a topic other than the baby or herself, they tend to be more closely tied to the situation at hand.

The above results, then, taken with the Group II categories of repetition and self answers, where it was found that a higher incidence of such features obtained in the Live condition, confirm the position put forward here that the infant is an active participant, and that features of mother's baby talk are in part adaptations to such a capacity. This argues against Snow's analysis of the nature of conversations between mother and baby at three months (Snow, 1977a). She considers this last group of features of mother's speech to be a reflection of the 'inadequacy' of the infant as a conversational partner. If this view allowed for differences at all between the mother's speech in the two conditions here, it would seem to predict ^{that} these features would increase in the Replay condition since they would be taken to rest upon non-responsiveness or failure to "turn-take" in the infant. However, since the results tend to go in the opposite direction, it would seem more accurate to assume, on the contrary, that they rely upon 'responsiveness', although of course of a non-linguistic kind, in the baby. Such a conclusion would, as noted above, accord with the views of Stern (1977) Papousek (1975) and Gleason (1977) on this issue.

On the other hand the results of the Group III categories show that the complexity measures fail overall both to differentiate the two conditions, and to replicate the pattern found in Snow's 1972 data. On these grounds our hypothesis that these qualities of mother's speech might be influenced by interactive feedback variables available in the Live condition is not confirmed. There are several reasons why this should be so. It may be the case that the M.L.U. is an insensitive index under the age of 19 months in distinguishing fine interactive differences - (although it has been shown to be sensitive to a range of child variables above and Phillips, 1973; Lieven, 1978; Shatz and Gelman, 1977; Snow, 1972). This argument is supported by Phillips' find-

ing (Phillips, op.cit.) that M.L.U. in speech addressed to infants between 8 and 18 months showed no change with the subject's age. Snow, too, (1977a) found that M.L.U. did not change between 3 and 18 months, and she also found that it did not differentiate between different social classes, which were distinguished by other measures of interactive style.

Taken in the context of these considerations then, the failure of the M.L.U. and other measures of complexity apart from the degree of repetition, to distinguish the two conditions here is not perhaps surprising, and should not therefore unduly prejudice one against the hypothesis we are proposing, that the mother's actions are in part determined by the responsiveness of her baby as an active partner. Rather should this finding, perhaps, make one more reluctant to use such measures to index the process of communication, ^{at least} for the age under consideration here

The fact of these systematic differences in the style of the mother's speech between the two conditions for categories in Groups I and II is relevant, then, to the initial question to which the experiment was addressed, i.e. the nature of the interactive status of the infant in such early face-to-face encounters with their mother. As we have outlined above, the model commonly put forward to describe these interactions assumes the conversation-like form of the outcome to be entirely due to the mother's skill in filling in the pauses in the flow of the infant's spontaneous and unresponsive behaviour, which only becomes harnessed to the actions of the mother and thus gains an interactive quality through time, by a process of association; little in the way of genuine two-way interaction or reciprocity is assumed to be taking place (e.g. Schaffer, 1974, 1977). According to this model we would expect no differences to be found in the mother's behaviour in the two

conditions, since her task in each in terms of filling in the gaps is precisely the same. The obtained differences indicate then the inadequacy of such a model: the only difference between the two experimental conditions is the relationship of the infant's acts to those of the mother, both in time and in context, and we would therefore argue that capacities for responsive and appropriate action on the infant's part actively contributes to the typically obtained two-way, conversation-like nature of the outcome. This conclusion is more consistent with psycho-analytic interpretations and with the theory of intersubjectivity.

The parameters along which these differences lie relate to the secondary question about the aspects of baby talk which are particularly sensitive to such interactive qualities. Although it was found from the results on the third group of utterance characteristics that features such as M.L.U. and others associated with this seem, at this age at least, not to change along with these interactive variables, the other measures in Groups I and II chosen for analysis consistently differed between the two conditions, showing, it is claimed, these features of the mother's baby talk to be sensitive to fine responsiveness in the child.

In considering both the nature and direction of the changes which are brought about in the mother's speech across the two conditions, we have drawn analogies with the patterns of speech found to distinguish interactions with a high degree of mutual coordination, as opposed to those in which one or both partners seems more unresponsive, and with those found where the child is adept at employing language to express his needs and intentions. Thus, e.g. Lieven (1978) finds that the mother who seemed to be more 'tuned in' (Lieven's phrase) to, and more accepting of what her child said tended to respond to her child more often with a question. Likewise Ringler et al, (1975) in a follow up of Kenell and Klaus's work on the effects of separating mother and infant

after birth, found that the extended contact group at 24 months asked twice as many questions and used fewer imperatives than controls. He suggests that these mothers show more use of feedback productive forms and generally had a higher level of interaction with their children, showing furthermore a greater sense of the child as a separate being than the control mothers. Lieven (1978) found fewer prompt questions in the mother-infant pair mentioned above, and a tendency for there to be fewer directives and fewer questions. Snow et al (1976) suggests that children in different social classes come to differ in their ability to adequately meet the demands of many communicative situations, and found in the speech of her working class mothers more imperatives and directives and fewer questions than in the two middle class groups. Nelson (1973) found the proportion of directives in mother's speech to be negatively correlated with progress in early vocabulary acquisition. Similarly Newport et al (1977) found a negative partial correlation between the child's growth rate for noun (inflection) and the mother's use of imperatives. With regard to the incidence of contentless utterances which was found to be higher in the live condition, Sylvester-Bradley and Trevarthen (1978) found the incidence of such utterances to increase during the sessions in which their subject showed a relatively high degree of interaction with her mother in terms of the amount of eye-contact and smiling.

However, it might be argued that another interpretation of the results is possible which does not imply the extent of the infant's interactive effectiveness that we have argued for here. It is thus relevant at this point to outline such an alternative position and to evaluate its ability against that taken here to account for the obtained differences in the mother's speech. Such a view, in an extreme form, might tend to see the mother's conversational style less in terms of the outcome of a reciprocal interaction than as a package speech style,

automatically turned on or off according to cues such as the age of the child. Adherents to this ^{view} _N would tend to see the conversational style occurring when two adults talk together as somehow more 'natural' for the individual adult than 'baby talk' or 'motherese', which might be conceived as an effortful adjustment from adult speech, even though it may go in the direction of increased simplicity. Thus, Ferguson (1977) describes baby talk as a simplified register and emphasises how its features may be derived from speech spoken to adults by linguistic processes, many of which are simplifying or reducing in nature. Brown (1977) suggests that baby talk can be derived in a lawful way from adult sources and it is seen as a register which mothers may slip out of through fatigue or forgetfulness. Indeed an implicit continuum from adult addressed speech to infant addressed speech is often veiled in many reports on characteristic differences between speech styles in these contexts.

In considering the qualitative nature of the changes brought about, it should be noted that although the general tendency in the replay condition is for the mother's speech to become more like speech addressed to adults along several of the parameters analysed, e.g. from a high to low incidence of questions, self answers and repetitiveness (Snow, 1977a; Cross, 1977; Newport et al, 1977) and from almost exclusive reference to the child as subject to a greater spread of subject matter (Cross, 1977; Snow, 1977a) it is claimed nevertheless that an analysis in such terms would be inadequate in several respects. Firstly, it fails to account for all the data; such a model would predict, for instance, a decrease in the Replay condition of imperatives and directives, of which a high incidence has been shown to be more typical of speech to infants than to older subjects (Snow, 1977a; Lieven, 1978; Newport et al, 1977) rather than the obtained trend of an increase in the Replay condition. Further-

more, although this model as well as the one in fact proposed here would predict an increasing number of references to objects or events rather than references to the child alone, as was the case in the second replay condition, it would not necessarily predict an increase in reference to the mother herself as subject - thus Cross (1977) found references to the mother alone not to show significant correlations with any of her child variables. Moreover, no evidence is known to date which would predict the increase in the incidence of what have been termed 'negative statements' on the grounds of the mother slipping out of a baby talk register.

On the other hand, it was felt that an interpretation in terms of the loss of the usual interactive quality of the exchange better accounts for the nature of the speech changes. As a rule the mother feels and indeed reports her infant's actions to be whole integrated acts which are potentially interpretable as intentional (rather than purely at the level of reflexly synchronized body movements) and to be related to her own acts and feelings (Kaye, 1977; Newson, 1977; Trevarthen, 1979). In the normal state of affairs, as in the Live condition, the mother typically communicates most effectively with her infant by entering into what Trevarthen (1979) describes as an assisting or solicitous form of intersubjectivity; this involves a receptive interpreting of the child's actions and affects which thus become shared and capable of development with the child, and this is expressed in a complex of modalities, including her speech style, which then shows the corresponding qualities usually described of baby talk, e.g. the high level of questions, self answers, degree of repetitiveness and high incidence of references to the child as subject. The establishment and maintenance of this mode in which the mother identifies with her infant, it is claimed, depends upon the active engagement of the infant and is thus the outcome of a joint

process, for when the infant's actions no longer remain in responsive interaction with those of his mother, as in the Replay condition, she is no longer able to maintain this style of communication, but in her efforts to do so becomes as a consequence more directive, corrective, shows a change of initiative towards herself, and shows less consistency, or repetitiveness in her speech. Although she still addresses herself to her baby (and this is indicated by her maintenance of such features as M.L.U. at the appropriate level) she is no longer able to communicate in the way she did ~~se~~ before and thus adopts other strategies to re-establish the exchange. These adaptations illustrate the point then that for any age of the child, the quality of speech in the parent is not a simple formula to be slotted into, but arises as a function of the type of interpersonal interaction which takes place. The content analysis in particular conveys the impression of greater anxiety and feeling of being ill at ease in the Replay condition, rather than its provoking a less effortful or more relaxed speech style. In this context it is interesting to note that the pattern in the Replay condition here corresponds closely to the types of communicative attempts which those who have to do with autistic children are found to make (Richer, 1974) and may indicate that this too is to some extent a natural adaptation to the child's apparently unresponsive behaviour.

Some of the mother's spontaneous remarks recorded in casual conversation with E, whilst still unaware of the nature of the experiment, reinforce the interpretation above.

S1 - comments on the last session (replay condition)

"You know when he started to cry I felt I had lost control of the situation and I can't stop him crying by just speaking, I've got to hold him; then I felt I couldn't do anything ..."

S3 - "The third one (replay) was a lot heavier work for me, I felt really tired, I felt I wasn't really getting anything."

S4 - "Well, in the one when I asked if she could hear (2nd replay) I felt she wasn't responding to me, there was a barrier you know, it was as though I wasn't there and I just felt, well, either she's not hearing me or she's not seeing me - something, mmm. At the end of the third (second live) I felt she could feel something from me, feel something. In the other it was as though there was something between us and I wasn't getting through at all."

These remarks were prompted by open-ended loosely directive questions by E as, "Well, how did you find things?" The differentiation between conditions revealed in these remarks draws attention to the failure of the five point scale to reflect the changes in the communicative process, and in fact it is probably the case that the responses to this scale were largely determined by indices of attention in the mother's direction, e.g. amount of time the infant's eyes were focused on her from the screen rather than the quality of interaction between them. Nevertheless, neither the mothers' answers to the scale nor their spontaneous comments revealed awareness at a conscious level of the nature of the experimental manipulation. This may be due to two factors: firstly the mothers were preset to view the interactions as live ones since they were not informed of the point of the experiment, and secondly most of the adaptation is an unconscious one. As we have seen above (p.166) in Ferguson's work the same was found to be true for aspects of adult interactions.

The fact of these systematic differences distinguishing the live and replay conditions accords, then, with our hypothesis that the infant's responsiveness to what the mother does is communicative, in the sense that it is effective in (at least partially) influencing the course of the interaction and in contributing to that quality of speech and behaviour in the mother which is found to typify such well-coordinated interactions as described by Lieven, Winnicott and Trevarthen. This consideration of the active influence of the infant in contributing to this

particular aspect of the mother's behaviour not only has important implications for the theory of the social status of the infant, but also for the descriptions given of mothers - e.g. in Ainsworth's Scales as being sensitive or insensitive, accepting or rejecting, etc. While a fairly detailed description is given of sensitive versus insensitive behaviour in the mother, the accompanying infant qualities receive relatively scant attention, and, furthermore, the emphasis is on infant characteristics such as obedience and compliance as emerging within the context of sensitive and accepting mothering. The data presented here, however, illustrates the possibility which Bernal so aptly noted (Bernal, 1974) that such descriptions of the mothers may be just as much a comment on the infants as on the mothers themselves, or at the very least draws attention to the possibility that such qualities as, e.g. sensitivity, in the mother may be very much a reflection of an interactional process rather than of independent characteristics residing in one of the pair alone. Indeed Ainsworth's dimensions of sensitivity and acceptance closely match the characteristics of infant- versus mother-centred utterances, the sensitive mother being,

"one who is finely attuned to the baby's signals and communications and able to see things from his point of view. She is aware of signals, interprets them accurately and responds to them promptly and appropriately. The insensitive mother is geared almost exclusively to her own wishes, moods and activity; her interventions tend to be prompted by signals within herself are therefore rarely contingent upon the baby's signals." (Stayton, Hogan and Ainsworth, 1971)

The conclusions reached here with regard to the active nature of the infant's contributions to the interaction conform with the tendency noted above (p.¹⁶²) where the emphasis on the influence of parental characteristics on the child has been redressed in favour of a more two-way interactional picture, and moreover extend the scope of qualities acknowledged to be effective in the infant to include factors which are

perhaps less autonomous than those generally cited (e.g. sex, state) but which are more genuinely active components of the interactional process.

Appendix to Chapter 7

Samples of the mother's speech during the two conditions which highlight the distinguishing features are shown below. Speech during the live condition is shown in the left-hand column. The speech samples here are synchronized, meaning that the ^{mother} was speaking to exactly the same run of film each time.

- | | |
|---|--|
| <p>1. David
David
I can move from side to side too

You're making me sea-sick doing that
You are
What are you doing?
What are you doing?
Eh?
What are you doing?
Tweetie pie
You've got hiccoughs now from the look of it
Have you?
Do you not like being so close?

Eh?
You're looking at me more though

You wee horror
You are</p> | <p>David
You not going to speak to mum?
You not going to speak to your mum?

Are you not going to speak to mummy?

Your chin's all wet too
It's shocking
What are you doing?
What are you saying?

Are you missing mummy?
I bet you when I come back you don't even bother
What's your sister doing?
Can you see your sister from where you're sitting?
You know where she is?
She's floating about somewhere, she is.
Hey
What are you doing?</p> |
| <p>2. Joseph
Come on
Here we are again
Here we are again</p> | <p>Joseph
Oh dear
Is it boring again?
Is it boring?</p> |
| <p>3. That's a little bit better
Yes

You're a lot happier
Are you saying something?</p> | <p>Is that Joseph talking?
Oh

You're looking up in the sky
He's looking up in the sky</p> |

Are you saying something to me?

Is that you saying something?

Are you talking to me, Joseph?

4. What's that?

Are you going to tell me about it
Dougal?

Come on tell me about it, say 'goo'

Dougal

Ahah

Are you smiling?

What's the joke?

Hello

Hello

Hello in there

Hello in there

5. Bubbles

Hello little bubbles

Come on

Oh, baby

Oh baby

Oh what a pretty girl

Oh so pretty

Oh baby

Oh baby

Where is the television then?

You're still listening to me
chatting aren't you?

Come on then

Give us a noise

Oh look at him

Look at his smiles

Come on you look over here

Come on

Hello

Hello

Hello, can you see me?

Can you see me?

Can you see me, little man?

Can you see me?

(Pause)

No, not bothered

Very strange this, isn't it?

Just spitting and spitting

No smiles today

Oh dear

Oh dear

Oh baby

Oh baby

Oh baby

Oh Sabrina

Come on

CHAPTER 8

SUMMARY AND GENERAL CONCLUSIONS

From a survey of the literature on infant social development it is evident that one of the most prevalent views is that, at first, the infant is fundamentally asocial, without the status of a fully personal being. By this it is meant, inter alia, that the young baby is not considered either to perceive other people as distinct from physical objects and events, or as identifiable with himself—manifesting in their actions and appearances processes of attending, intending and feeling in a way which may be directly apprehended. Rather the infant is held to acquire such personal or social capacities either by a process of internalizing others' interpretations and attributions (e.g. Richards, Shotter, Kaye) or, within a more cognitive framework, through: a) coming to identify a class of people as distinct from other objects and events by their association with rewards of a perceptual or cognitive nature, b) the achievement of certain cognitive milestones, and c) through learned associations between their own reflexive and autonomous behaviour patterns and the consistent responses made to them by others (e.g. Schaffer, Papousek, Watson).

The important question, however, of precisely how such a transition is effected, and the consideration of what capacities must be assumed to inhere in the infant for such a development to occur at all has been very largely neglected; ^{and} this leads to the paradoxical position that some of the capacities assumed to be acquired during the process of internalization or ^{intake} (take up) of information are, in fact, prerequisites for the same process taking place at all. These are the kinds of capacities assumed to be present in the psychoanalytic theories of Winnicott, Klein and Fairbairn, and are explicitly proposed by those advocating a theory of intersubjectivity - e.g. Trevarthen, Bruner, Tronick. They include,

on the expressive side, forms of behaviour with rudimentary intentional structure, accompanied by expressions of emotion; and, with regard to sensitivities, the ability to perceive such qualities in the activity, attentions and expressions of others. ^{They include,} Furthermore, the motivation to couple one's own intentions with those of others and engage in reciprocal relationships.

The differences in the above approaches lead inevitably to very disparate conceptions of the relative contributions of mother and infant to the conversation-like form of early face-to-face exchanges. Those who propose an intersubjective capacity see the interchange as a genuinely two-way affair, mother and baby both actively regulating their behaviour to achieve personal reciprocity, the baby as well as the mother showing complex adaptations to the attentions and emotional expressions of the partner as events of a personal significance which cannot be reduced to physical dimensions. In the other approaches, however, the failure to acknowledge such capacities has led to ^{both} the mother's superior skills and cultural knowledge being emphasised, and ^{the} the different motives she is assumed to bring to the interaction. These factors are seen as making the exchanges fundamentally asymmetrical with no two-way personal interaction in the sense discussed above taking place for some time.

The purpose of my research was to evaluate these different views, and in particular to critically examine some of the claims of those proposing an intersubjective capacity in babies under three months - namely -

- a) the sensitivity of the baby to aspects of the mother's behaviour, such as the form and timing in relation to the baby's;
- b) the expressive capacities, including emotional components, and the organization of behaviour;
- c) regulatory capacities and the question of the baby's commitment or intention to engage in reciprocal personal exchanges.

In order to achieve these objectives it was decided to use perturbatory procedures within the context of observations of normal interactions, both on the grounds of difficulties encountered in total reliance on naturalistic observations, and a recognition of the contribution already made of applying such methods to other areas of infant research which had also, indirectly, enhanced the understanding of early interpersonal capacities.

A selection of perturbatory procedures was designed in order to distinguish between the alternative theories of the nature of the infant's contribution to, and involvement in, face-to-face exchanges, ^{to isolate} and the factors determining the quality of affective expression and the direction of attention. These consisted of examining the infant's behaviour in the face of the following: a) the mother's becoming suddenly still and unresponsive to him; b) the interaction being naturalistically interrupted by the entrance of an intruder who engaged the mother briefly in conversation, and c) the mother's behaviour, whilst remaining constant in form, becoming unco-ordinated with respect to the baby's on-going activity. The baby's behaviour during these perturbations was compared to that obtaining in unperturbed phases of interaction. A fine level of description in terms of precisely categorized forms of behaviour was used which encompassed a consideration both of the occurrence of a range of individual acts and expressions of the baby, and of their organization in time and with respect to each other.

Finally, an experiment was conducted to test the effectiveness of the infant's ongoing activity and responsiveness in relation to the mother's behaviour in influencing the quality and conversation-like structure of their interaction. This too employed the principle of perturbation, this time in the presentation of the baby to the mother.

A comparison of the baby's behaviour in the face of these different

situations strongly confirms the claims made by those proposing some kind of intersubjective capacity in infants of this age.

1. Sensitivity. The subtle differences between the various interactive situations here - normal and perturbatory, at times involving only a slight variation in the direction of gaze, or an alteration to the timing relationship between the mother's and baby's acts, were invariably and consistently responded to by all infants, so implicating a high degree of sensitivity. The result of experimental comparisons furthermore permits one to infer that such sensitivity cannot be described purely in terms of reactions to alterations in the physical dimensions of the mother's presentation (an explanation put forward in terms of the discrepancy hypothesis or contingency theory), divorced from the interpersonal significance which such changes carry; and thus offers support for the claims of sensitivity made by those proposing an intersubjective capacity in infants of this age.

2. Expressive capacities. The analysis of differences in the occurrence, form and temporal organization of infant acts and expressions across the different treatments yields evidence of a coherent and complex repertoire of behaviour for participating in and regulating interpersonal interactions, the infant becoming distressed or puzzled by the Blank and Unco-ordinated conditions, but showing undistressed interest during the interruption. In particular acts of attending, communicating and expressing emotion show systematic changes in the face of the different presentations offered by the mother, not only in their overall frequency of occurrence, but ^{also} in their average duration and their patterns of co-occurrence.

This evidence of the sensitivity and expressive capacities also constitutes strong support and extension for theories of infant

emotionality developing the Darwinian position - ethological or attachment, psychoanalytic (object-relations) and the theory of Intersubjectivity. They argue against more reductionist^t current views which see the baby as initially insensitive to all but gross physical changes in the environment, with only a simple and poorly organized range.

3. Adaptive and regulatory capacities and the Infant's commitment to engage in reciprocal personal interactions.

Not only is evidence of complex expressive capacities yielded by the form of the infant's responses to the various perturbations, but the quality and nature of those reactions would also appear to endorse the third kind of claim put forward in the theory of Intersubjectivity, - that the infant possesses adaptive and regulatory aspects of behaviour, and the commitment to engage in reciprocal communication with the partner. This claim is more difficult to substantiate than the other two since as yet no fully developed, systematic theory of the personal exists, certainly in infant work, which would lend criteria for, and give definition to, the constituents of adaptiveness and appropriateness. Nevertheless, the distinct and different forms of the baby's reactions to each of the various interactive situations, appearing readily interpretable as states carrying interpersonal significance - e.g. protest, solicitation, interest, dejection, puzzlement - seem to make good intuitive or 'human' sense in terms of each being appropriate to the particular presentation provoking it. In particular the manifestations of protest or solicitation, and of distress in the face of the breakdown in communication, lend weight to the view that the infant has intentions to engage in reciprocal, harmonious interactions.

The active nature of the baby's role is also reflected in the differences which were found in the mother's baby-talk during interactions differing only in whether her baby was potentially responsive to her

communications or not.

Implications for models of interactions and social development

The evidence presented above, then, leads one to reconsider the models often put forward to describe the conversation-like form of early exchanges between mother and baby. These stress a contrast between the mother and baby. The mother is assumed to bring different and acquired motives to engage in encounters of a personal kind, as well as expressive, responsive and adaptive skills quite lacking to the young baby, and, of course, an incontestable cultural experience and maturity. The baby, however, is seen to have behaviour which is largely autonomous, undirected and insensitive to the progress of their communication.

The data presented here, however, on the sensitivities, expressive skills and capacity for active, regulatory adaptations in the face of perturbations, and the demonstration of the influence of such factors on the quality of the mother's speech, requires the interchange to be seen as one occurring between two persons, who, in spite of differences in knowledge, reason, authority and maturity, are yet both equipped with a fundamental intersubjective capacity permitting them to identify and express attentions, affects and intentions of personal significance, and to regulate their behaviour accordingly.

This revision also entails a reconsideration of broader developmental issues. It has been noted how in much current theory primacy is given to cognitive and perceptual functioning, or propensities thought of as purely biological, and the infant is seen as having to acquire interpersonal or social capacities, both through cognitive developments, and the constructive efforts of the mother in particular. The demonstration of a rudimentary intersubjective capacity in young infants leads, however, to a different conception of social and indeed other aspects of development. In regard to the social, instead of the mother being considered

totally formative, first attaching and then securing personal significance to random or purely organic infant behaviour, her role may be seen as enriching and fulfilling, having such functions as making concrete immature infant intentions and complementing them, as well as letting the infant know the attitudes and feelings both she and the wider culture hold in relation to his actions and the experiences and feelings they express. ^{Such a role} All this does indeed embellish and give more content to existing, albeit nascent, infant intentions, and undoubtedly (the mother's contribution) makes more substantial his participation in the family and wider community life. But it is far from being totally creative of it.

The demonstration of a fundamental intersubjective capacity operating in such a rich way at a time when the infant's skills and interests in the world of objects are relatively immature also carries the implication that the cognitive capacities and operations often assumed to be primary, may in fact be largely derivative or emergent. This possibility is gaining increasing recognition in work with older children, where Donaldson, in particular, has shown how performance in experiments formerly thought of as purely cognitive in character is enormously influenced, or even determined, by the child's perceptions of the intentions and personal relationships inherent in the whole situation. Contemporary work in developmental linguistics is entirely concurrent with this line of thought (Waterson and Snow, 1978; Bullowa, 1979).

Prospect for development of the work carried out here

We have tried to show above, on the basis of the evidence for a fundamental intersubjectivity present in young infants, the importance of incorporating the concept of the personal into theories of social and cognitive development. The work carried out here, while providing strong evidence for such an intersubjective capacity, is only preliminary in its contribution to building up a coherent theory and language of the

personal. (McMurray, 1961). It is considered that one of the most fruitful developments of this work would be a systematic exploration building up ^{of a} corpus of evidence on the perception of different affective and intentional states, and their mutual regulation in the mother-infant pair, leading to the ^{development} of a lexicon of interpersonal functions.

Application of The Double V.T.R. technique (using a colour system, and correcting for L/R inversion) is seen as potentially making a valuable contribution to the achievement of this task, permitting as it does both possibilities for the full-face analysis of fine interrelations between the affective expressions of the two partners as they occur in live communications, and the use of stored images for standardized presentation of expressions of particular affective states in both mother and infant.

It is thought too that the development of such a lexicon would have valuable applications in the field of psychopathology where a corpus of evidence on normal regulatory functions in interactions could provide more adequate criteria for, and explanations of breakdown. The method would permit examination of the expressive contributions of different partners in a variety of confrontations, e.g. parent and infant, parent and spouse, patient and therapist. It would lead to a corpus of data from which to build a theory and practice of diagnosis and treatment, both objective and sensitive to the real complexity of human emotions and personal sensitivities. On a broad philosophical plane it is hoped that this work has made a worthwhile contribution to the systematic study of interpersonal relationships and their regulation.

APPENDIX I1) 1st item of code: The parameter of direction of attention

The four gaze categories originally scored are collapsed into three:

- 0) gaze to mother or mother's act (original category 1)
- 1) gaze to E (originally act 2)
- 2) gaze away from mother (originally acts 3 and 4).

2) 2nd item of code:

The parameter of affect on a six point scale (0 - 5) ranging from negative to positive affect. This consists of a three dimensional matrix, 1st dimension being mouth postures, the second, eyebrow, and the third for expression.

a) the following acts were collapsed into the grimace category:

chew, bite lower lip, and pout (acts 27, 29, 30 — 28)

Crying was taken as superordinate over suck thumb, yawn and grimace (thus act 32 + 33, 31 or 28 — 32)

Suck thumb was taken as superordinate over yawn and grimace (act 33 with 31 or 28 — 33)

Yawn took precedence over grimace (act 31 with 28 — 31)

The following values were then assigned:

Cry		-2
Suck thumb	}	-1
Yawn		
Grimace		
None of these		0

b) Eyebrows:

The following values were assigned:

eyebrows raised	+1 (34)
raised frown	} 0 (35A)
relaxed	
frown	-1 (35)

c) Expression:

smile was scored as 1

neutral as 0

These dimensions give the table shown below, three being added to all totals to make all scores positive.

eyebrows	raised +1		raised frown 0		relaxed 0		frown -1	
mouth								
	smile 1	neutral 0	smile 1	neutral 0	smile 1	neutral 0	smile 1	neutral 0
cry -1	3	2	2	1	2	1	1	0
grimace -1	4	3	3	2	3	2	2	1
yawn -1	4	3	3	2	3	2	2	1
suck thumb -1	4	3	3	2	3	2	2	1
none 0	5	4	4	3	4	3	3	2

3) Parameter of Activity Level: 3rd code item

Scale (0 - 8)

a) vertical arm positions were scored as follows:

0 for each arm at side (7A, 16A)

1 for each arm below shoulder (6, 15)

2 for each arm at, above shoulder (7, 16)

2 for each arm below shoulder and outstretched (6 + 9, 15 + 18)

b) lateral/frontal positions

0 for each arm in front of the body (8, 17)

1 for each arm beyond body (8A, 17A)

c) touching clothes or face:

0 for each arm touching clothes or face (10, 11, 19, 20)

1 for each arm not touching clothes or face

This gives the table shown below:

lateral/ frontal vertical	2 beyond 0 in front			1 beyond 1 in front			0 beyond 2 in front		
	2 tch cl 0	1 tch cl 1	0 tch cl 2	2 tch cl 0	1 tch cl 1	0 tch cl 2	2 tch cl 0	1 tch cl 1	0 tch cl 2
2 at side 0	2	3	4	1	2	3	0	1	2
1 at side 1 below 1	3	4	5	2	3	4	1	2	3
2 below 2	4	5	6	3	4	5	2	3	4
1 at side 1 above 2	4	5	6	3	4	5	2	3	4
1 below 1 above 3	5	6	7	4	5	6	3	4	5
2 above 4	6	7	8	5	6	7	4	5	6

4) Parameter of force of utterance of Communicative Effort

(Scale 0 - 3)

- a) Mouth: Score 2 for wide open, shaped (25)
Score 1 for little open, relaxed (26)
Score 0 for closed (26A)

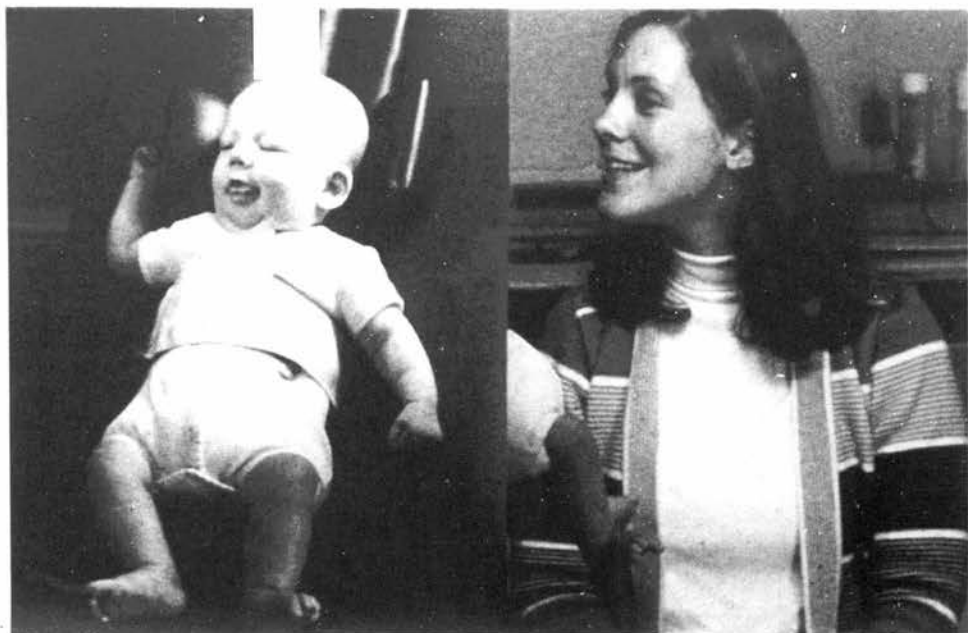
- b) Tonguing:
Score 1 for tonguing (24)
Score 0 for no tonguing

Mouth Tongue	Wide open 2	Little open/Relax 1	Closed 0
Tonguing 1	3	2	1
No tonguing 0	2	1	0

APPENDIX II

ILLUSTRATIONS OF THE RANGE OF INFANT COMMUNICATIVE AND
EXPRESSIVE STATES OCCURRING ACROSS THE VARIOUS TREATMENTS.

- A. Baby I; girl, 7 weeks; during normal communication, showing smiling, tonguing, wide open shaped mouth postures and arm gestures.

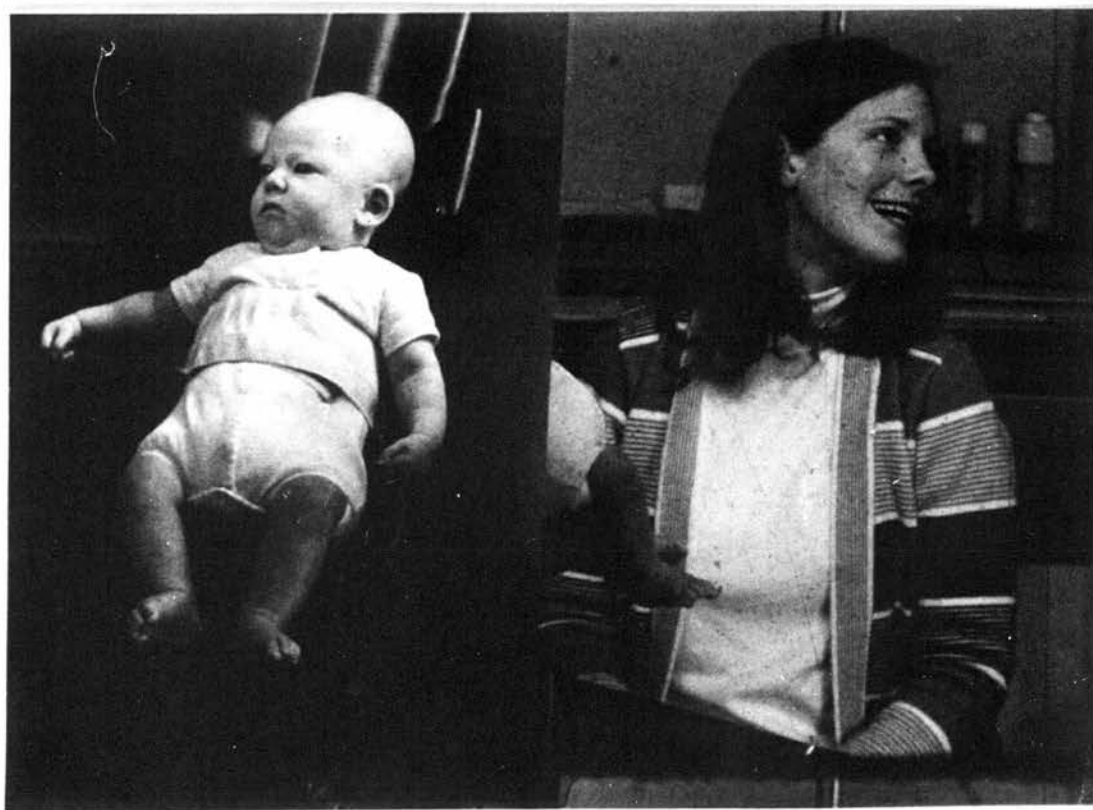


B. Baby II; boy, 7 weeks; during normal communication, showing tonguing, wide open shaped mouth postures and arm gestures.

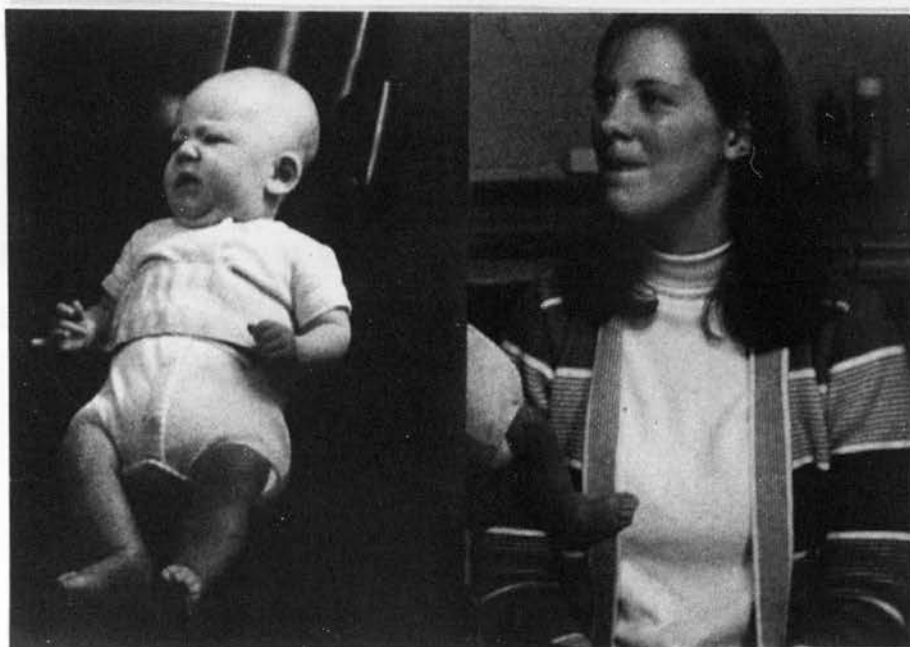
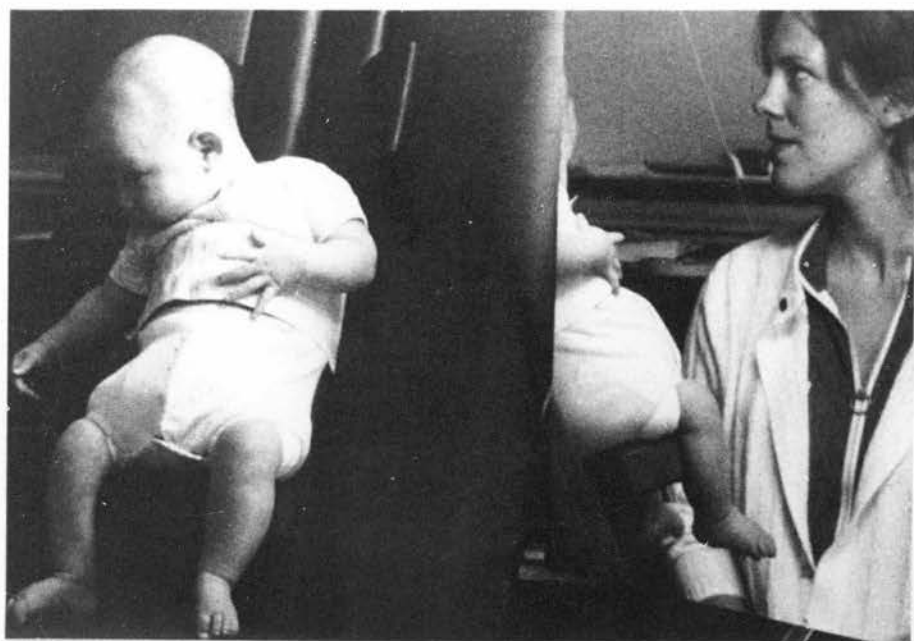


C. Babies I and II; 7 weeks, during the Interruption.

Communicative acts largely cease, and the babies watch their mothers quietly.

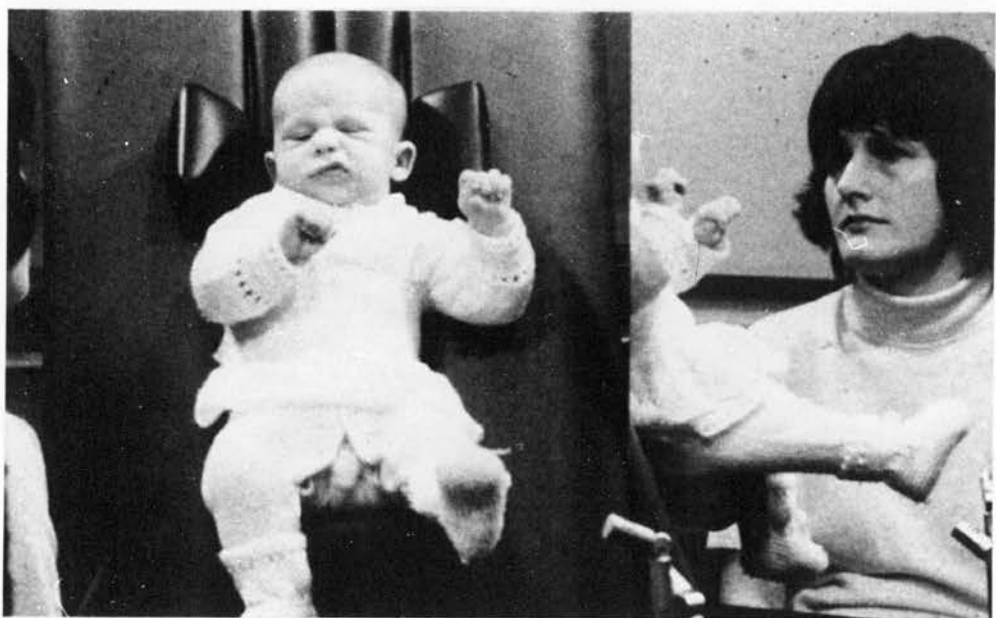
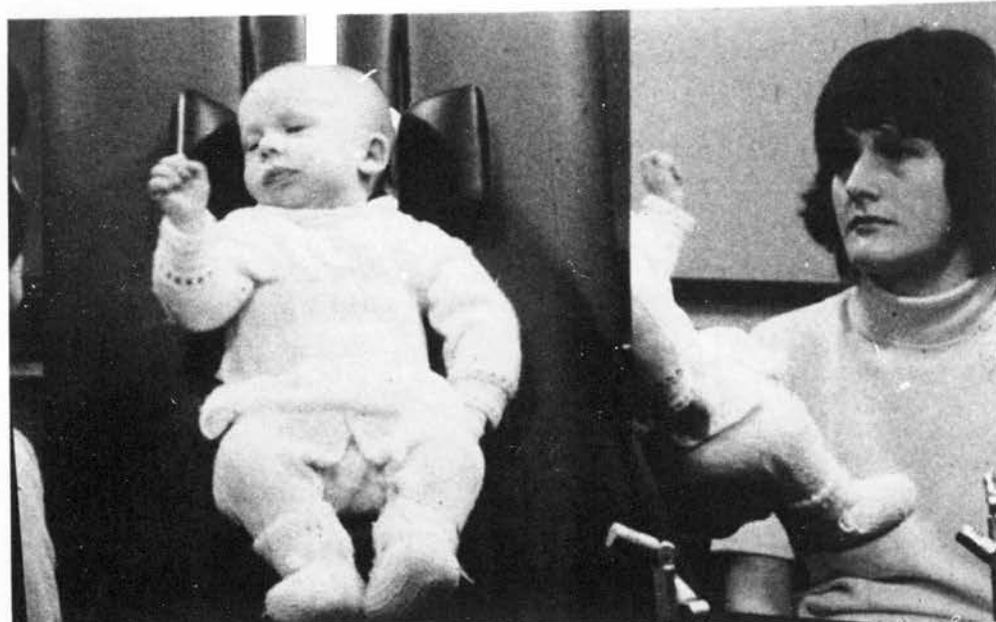


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- D. Baby I, girl, at 6, 7 and 9 weeks during the Blank-Face presentation, showing signs of dejection and withdrawal and distressed thrashing of the arms.

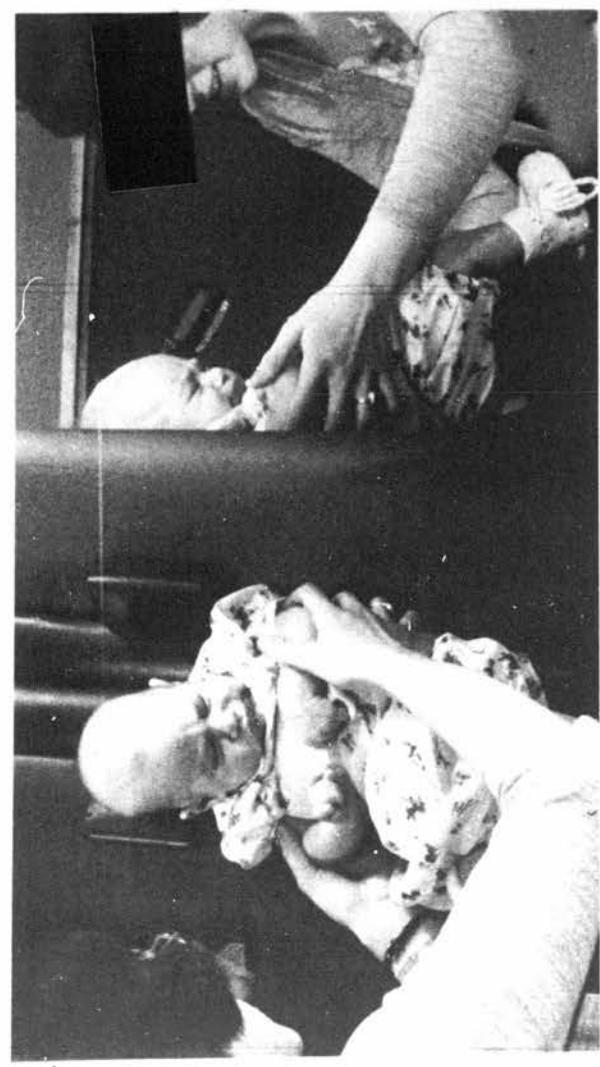
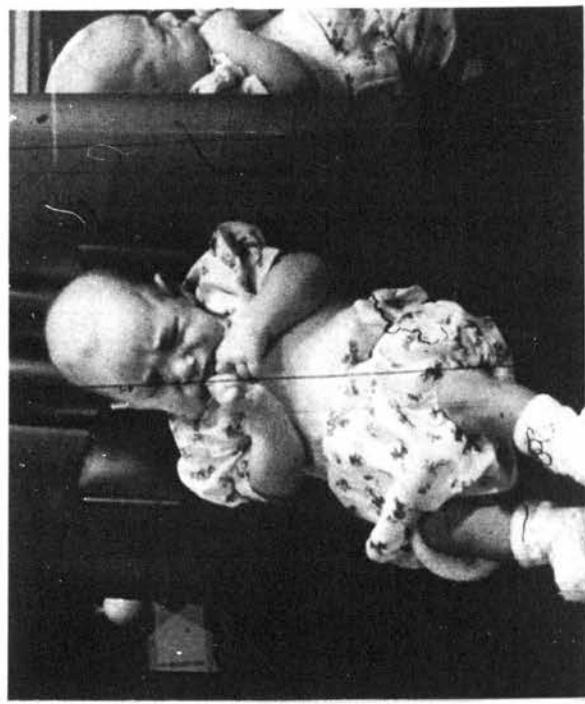
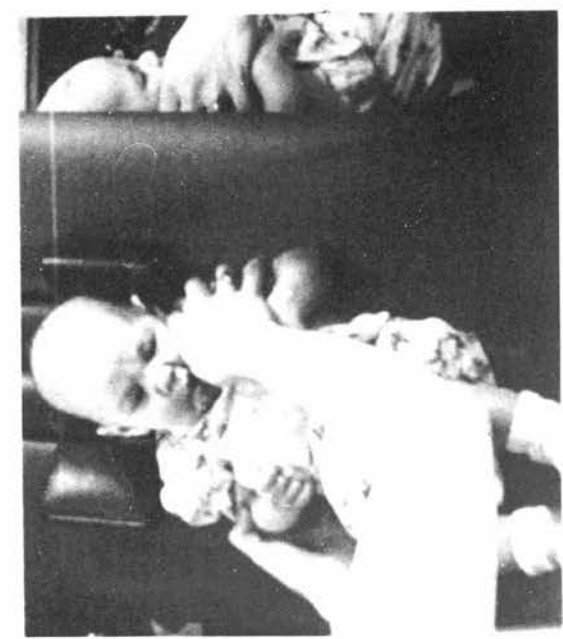
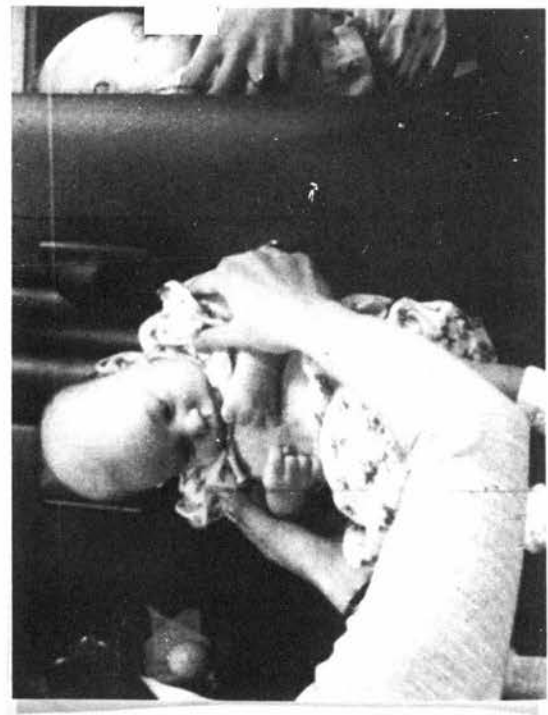


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E. Baby II, boy, at 9 weeks during the Blank-Face presentation, showing gaze avoidance, self-absorbed hand regard and grimacing.

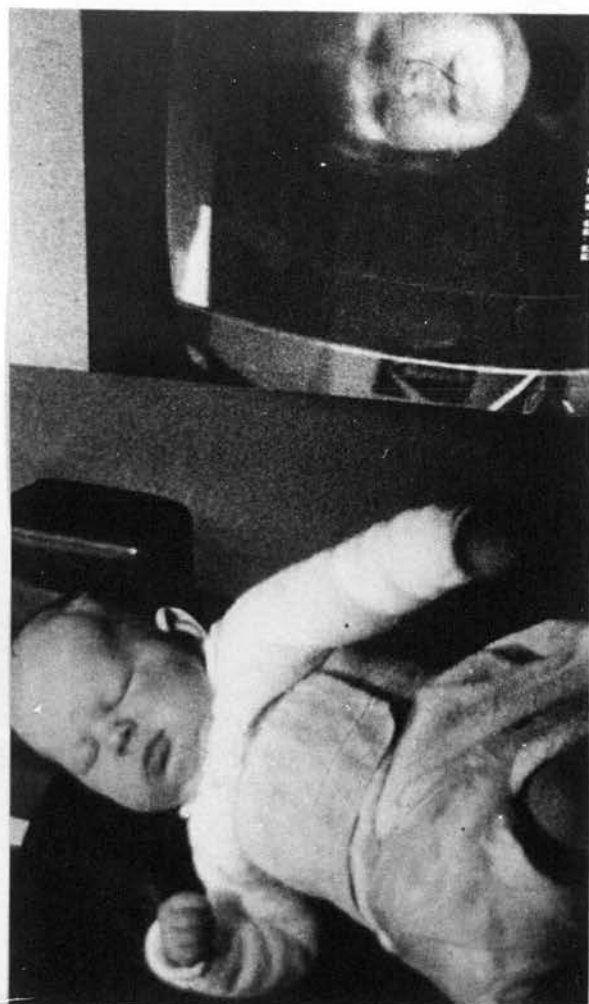
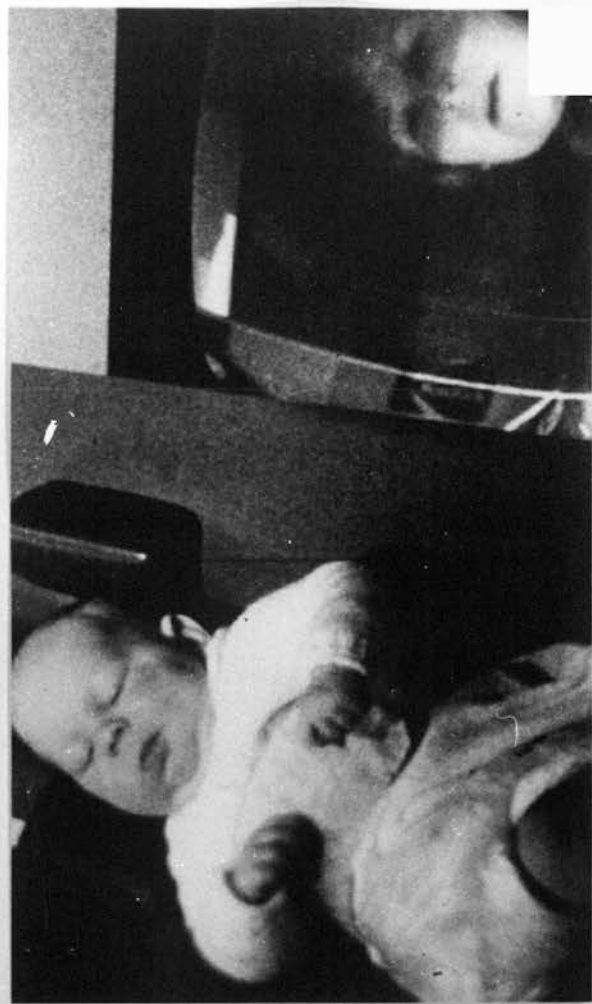


F. Depressed mother and her 8 week old baby boy, showing features found in other babies during the Blank-Face presentation - avoidance of contact, self-absorbed hand regard and fingering of clothes, and grimacing.



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G. Six week old baby boy during Double V.T.R Experiment:
on L. during live presentation, showing wide open shape mouth
postures and gesturing of arms; on R during Replay, showing
gaze aversion from screen, frowning, chewing and touching
clothes.



- H. Baby girl, 8 weeks, during Live presentation in Double V.T.R experiment, showing full face image available for analysis, and as seen by mother. Expressions include smiling, tonguing, wide open shape mouth postures, and gesturing.

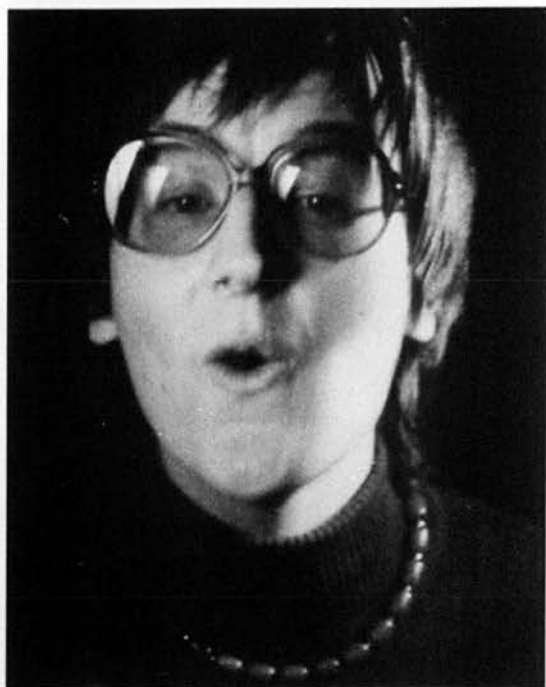


- 200
- I. Baby girl, 8 weeks, during Replay presentation in Double V.T.R experiment, showing pouting (top left), grimacing (top right), chewing (bottom left) and hands going to the mouth.



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J. Mother and baby in Double V.T.R situation;
showing, in top figures a correspondence of affect
between the partners, and below, a range of
empathetic and identifying attitudes in the mother.



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